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Attorney Docket No. 18696-000130US

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Date of Deposit: November 3, 1999

ASSISTANT COMMISSIONER FOR PATENTS
BOX PATENT APPLICATION
Washington, D.C. 20231

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By: Sunil Dutt

Sunil Dutt

Sir:

Transmitted herewith for filing under 37 CFR 1.53(b) is the
[X] continuation patent application

Inventor(s)/Applicant Identifier: Kenneth P. Lanahan, Thomas G. Durham, Stephen C. Foreman

For: AN IMPROVED SYNTHETIC PANEL AND METHOD

[X] This application claims priority from each of the following Application Nos./filing dates: Serial No. 09/322,268, filed May 28, 1999. Copending patent application Serial No. 09/322,268 was a continuation patent application of patent application having Serial No. 09/003,747, filed Jan. 7, 1998, now U.S. Patent No. 5,943,775. Patent application having Serial No. 09/003,747 was a continuation-in-part of patent application having Serial No. 08/556,265, filed Nov. 13, 1995, now U.S. Patent No. 5,842,276.

[X] Please amend this application by adding the following before the first sentence: "This is a continuation patent application of copending patent application having Serial No. 09/322,268, filed May 28, 1999. Copending patent application Serial No. 09/322,268 was a continuation patent application of patent application having Serial No. 09/003,747, filed Jan. 7, 1998, now U.S. Patent No. 5,943,775. Patent application having Serial No. 09/003,747 was a continuation-in-part of patent application having Serial No. 08/556,265, filed Nov. 13, 1995, now U.S. Patent No. 5,842,276. Benefit of all earlier filing dates is hereby claimed with respect to all common subject matter.

Enclosed are:
[X] 59 page(s) of specification
[X] 16 page(s) of claims
[X] 1 page of Abstract
[X] 26 sheet(s) of [ ] formal [X] informal drawing(s).
[X] An assignment of the invention to QB TECHNOLOGY (as previously filed)
[X] A [X] signed [ ] unsigned Declaration & Power of Attorney (as previously filed)
[X] A verified statement to establish small entity status under 37 CFR 1.9 and 37 CFR 1.27 [X] is enclosed (was filed in the prior application and small entity status is still proper and desired).
[X] Information Disclosure Statement under 37 CFR 1.97 with references.
[X] Preliminary Amendment
[X Ten(10) sheets of corrected drawings marked in red ink]

	(Col. 1)	(Col. 2)	SMALL ENTITY			OTHER THAN SMALL ENTITY	
FOR:	NO. FILED	NO. EXTRA	RATE	FEE	OR	RATE	FEE
BASIC FEE				$380.00	OR		$760.00
TOTAL CLAIMS	147 - 20	= *127	x $9.00 =	$1,143.00	OR	x $18.00 =	
INDEP. CLAIMS	15 - 3	= *12	x $39.00 =	$468.00	OR	x $78.00 =	
[ ] MULTIPLE DEPENDENT CLAIM PRESENTED			+ $130.00 =		OR	+ $260.00 =	
			TOTAL	$1,991.00	OR	TOTAL	

* If the difference in Col. 1 is less than 0, enter "0" in Col. 2.

Please charge Deposit Account No. 20-1430 as follows:
[X] Filing fee $ 1,991.00
[X] Any additional fees associated with this paper or during the pendency of this application.
[ ] The issue fee set in 37 CFR 1.18 at or before mailing of the Notice of Allowance, pursuant to 37 CFR 1.311(b)

[ ] A check for $____________ is enclosed.
2 extra copies of this sheet are enclosed.

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SF 1040485 v1

Respectfully submitted,
TOWNSEND and TOWNSEND and CREW LLP

John Carpenter
Reg No.: 26,447
Attorneys for Applicant

Atty. Docket No.

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) & 1.27(c)) - SMALL BUSINESS CONCERN

Applicant or Patentee: KENNETH P. LANAHAN
Application or Patent No.:
Filed or Issued:
Title: AN IMPROVED SYNTHETIC PANEL AND METHOD

I hereby declare that I am:

[ ] the owner of the small business concern identified below:
[X] an official of the small business concern empowered to act on behalf of the concern identified below:

Name of Small Business Concern: E.A. COLLINS
Address of Small Business Concern: 7448 W SAHARA
LAS VEGAS, NV 89117

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.12, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees to the United States Patent and Trademark Office, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled by inventor(s) described in:

[X] the specification filed herewith.
[ ] Application No. ______, filed ______.
[ ] Patent No. ______, issued ______.

If the rights held by the above-identified small business concern are not exclusive, each individual, concern or organization having rights in the invention is listed below* and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person made the invention, or by any concern that would not qualify as a small business concern under 37 CFR 1.9(d), or a nonprofit organization under 37 CFR 1.9(e).

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

Name
Address

[ ] Individual [ ] Small Business Concern [ ] Nonprofit Organization

Name
Address

[ ] Individual [ ] Small Business Concern [ ] Nonprofit Organization

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Name of Person Signing: Stephen C. Foreman
Title of Person if Other than Owner: Manager
Address of Person Signing: 7448 W. Sahara
Las Vegas, NV 89117

Signature Stephen C. Foreman Date 1/7/98

H:\WORK\FWC\18696\18696-11.VS?

Atty. Docket No. 18696-000110

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) and 1.27(b)) - INDEPENDENT INVENTOR

Applicant or Patentee: KENNETH P. LANAHAN
Application or Patent No.:
Filed or Issued:
Title: AN IMPROVED SYNTHETIC PANEL AND METHOD

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees to the Patent and Trademark Office regarding the invention entitled ______ described in:

[X] the specification filed herewith.
[ ] Application No. ______, filed ______.
[ ] Patent No. ______, issued ______.

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey or license any rights in the invention is listed below:*

[ ] No such person, concern, or organization
[X] Persons, concerns or organizations listed below*

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

Name QB TECHNOLOGY L.C.
Address 118 S.W. 2nd Avenue
Ava, MO 65608
[ ] Individual [X] Small Business Concern [ ] Nonprofit Organization

Name E A COLLINS
Address 7448 W SAHARA
LAS VEGAS, NV 89117
[X] Individual [ ] Small Business Concern [ ] Nonprofit Organization

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Name of Inventor: KENNETH P. LANAHAN	Name of Inventor:	Name of Inventor:
Kenneth P. Lanahan Signature of Inventor	Signature of Inventor	Signature of Inventor
Date 1-7-98	Date:	Date:

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Atty. Docket No.

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9(f) & 1.27(c)) - SMALL BUSINESS CONCERN

Applicant or Patentee: KENNETH P. LANAHAN
Application or Patent No.:
Filed or Issued:
Title: AN IMPROVED SYNTHETIC PANEL AND METHOD

I hereby declare that I am:

[ ] the owner of the small business concern identified below:
[X] an official of the small business concern empowered to act on behalf of the concern identified below:

Name of Small Business Concern: QB TECHNOLOGY L.C.
Address of Small Business Concern: 118 S.W. 2nd Avenue
Ava, MO 65608

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.12, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees to the United States Patent and Trademark Office, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled by inventor(s) described in:

[X] the specification filed herewith.
[ ] Application No. ______________, filed ______________.
[ ] Patent No. ______________, issued ______________.

If the rights held by the above-identified small business concern are not exclusive, each individual, concern or organization having rights in the invention is listed below* and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person made the invention, or by any concern that would not qualify as a small business concern under 37 CFR 1.9(d), or a nonprofit organization under 37 CFR 1.9(e).

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

Name
Address

[ ] Individual [ ] Small Business Concern [ ] Nonprofit Organization

Name
Address

[ ] Individual [ ] Small Business Concern [ ] Nonprofit Organization

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Name of Person Signing: Kenneth P. Lanahan
Title of Person if Other than Owner: Co-Owner/Manager
Address of Person Signing: 514 Buddy Court
Troy, IL 62294

Signature Kenneth P. Lanahan Date 1-7-98

AITWORKS\WC\...11.VS

I hereby certify that this correspondence is being deposited with the United States Postal Service Expressmail # EL378165840US in an envelope addressed to:

Assistant Commissioner for Patents
Washington, D.C. 20231

On November 3, 1999

TOWNSEND and TOWNSEND and CREW LLP

By: Sunil Dutt
Sunil Dutt

PATENT
Attorney Docket No.: 18696-0001-3US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

LANAHAN ET AL

Application No.: Not Assigned

Filed:

For: SYNTHETIC PANEL AND METHOD

Art Unit: 3726

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination of the above-referenced application, please enter the following amendments and remarks.

IN THE DRAWINGS:

Ten (10) sheets of drawings including Figs. 1, 6, 9, 10, 11, 15, 16, 19, 20, 20A, 20B, 21, 22, and 33 are enclosed with red-ink corrections. Approval by the Examiner is respectfully requested.

IN THE SPECIFICATION:

Page 1, line 1, after the title: "**AN IMPROVED SYNTHETIC PANEL AND METHOD**" insert -- This is a continuation patent application of copending patent application having Serial No. 09/322,268, filed May 28, 1999. Copending patent application Serial No. 09/322,268 was a continuation patent application of patent application having Serial No. 09/003,747, filed Jan. 7, 1998, now U.S. Patent No. 5,943,775. Patent application having Serial No. 09/003,747 was a continuation-in-part of patent application having Serial No. 08/556,265, filed Nov. 13, 1995, now U.S. Patent No. 5,842,276. Benefit of all earlier filing dates is hereby claimed with respect to all common subject matter.

Page 31, line 9, after "**12.**" insert --The polymeric foamed material **12** has a pair of opposed ends **12f** and **12g** (see Figs. 6, 9 and 10).--

Page 32, line 5, delete "The" and substitute therefor --As best shown in Figs. 20, 21 and 22, the--.

Page 32, line 6, after "$\mathbf{30r_1}$" insert --having opposed cut surfaces $\mathbf{30r_{1c}}$-$\mathbf{30r_{1c}}$ terminating in the opposed ends **12f** and **12g**--.

Page 32, line 7, delete "$\mathbf{30_s}$" and substitute therefor --**30s**--.

Page 32, line 8, after "$\mathbf{30_{r2}}$" insert --respectively having opposed cut surfaces $\mathbf{30w_c}$-$\mathbf{30w_c}$, $\mathbf{30f_c}$-$\mathbf{30f_c}$ and $\mathbf{30r_{2c}}$-$\mathbf{30r_{2c}}$--.

Page 32, line 10, after "**12r**" insert --having cut surface $\mathbf{12r_c}$--.

Page 32, line 14, delete "access" and substitute therefor --recess--.

Page 32, line 14, after "**12r**" insert --and respectively against cut surfaces $\mathbf{30r_{1c}}$-$\mathbf{30r_{1c}}$, and cut surface $\mathbf{12r_c}$--.

Page 32, line 16, after "**30w**" insert --and against cut surfaces $\mathbf{30w_c}$-$\mathbf{30w_c}$--.

Page 32, line 17, after "**30f**" insert --and against cut surfaces $\mathbf{30f_c}$-$\mathbf{30f_c}$, --.

Page 32, line 17, after "$\mathbf{30r_2}$" insert --and against cut surfaces $\mathbf{30r_{2c}}$-$\mathbf{30r_{2c}}$, --.

Page 32, line 17, after "**30s.**" insert --As further best shown in Figs. 20, 20A and 20B, there is seen a cut surface, generally illustrated as **12cs** and including cut surface $\mathbf{12cs_1}$ (e.g., a defined planar surface $\mathbf{12cs_1}$) and cut surface $\mathbf{12cs_2}$ (e.g., a defined planar surface $\mathbf{12cs_2}$). As best shown in Fig. 20A, web **14f** of brace member **14** is generally aligned with cut surface **12cs**, more specifically with cut surfaces $\mathbf{12cs_1}$ and $\mathbf{12cs_2}$. As will be further indicated hereinafter, if a hot wire (identified as "**58**" below) is used as a cutter for cutting or forming slot(s) **30** including the associated cut surfaces (e.g., $\mathbf{30w_c}$-$\mathbf{30w_c}$, $\mathbf{30f_c}$-$\mathbf{30f_c}$, $\mathbf{30r_{2c}}$-$\mathbf{30r_{2c}}$, etc.), the cut surface(s) are seared surfaces.--

Page 32, line 31, after "**12c.**" insert --Each of the polymeric foamed materials **12a** and **12b** respectively include the following as best shown in Fig. 20B: cut surface **12cs** including cut surfaces $\mathbf{12cs_1}$ and $\mathbf{12cs_2}$; slot section $\mathbf{30r_1}$ having opposed cut surfaces $\mathbf{30r_{1c}}$-$\mathbf{30r_{1c}}$; polymeric material recess **12r** including cut surface $\mathbf{12r_c}$; slot section **30w** comprising opposed cut surfaces $\mathbf{30w_c}$-$\mathbf{30w_c}$; slot section **30f** including opposed cut surfaces $\mathbf{30f_c}$-$\mathbf{30f_c}$; and slot section $\mathbf{30r_2}$ having opposed cut surfaces $\mathbf{30r_{2c}}$- $\mathbf{30r_{2c}}$.--

Page 42, line 18, after "**12**" insert --such as to terminate in the pair of opposed ends **12f** and **12g** of polymeric foamed material **12** (see Figs. 10 and 19).--

Page 42, line 19, delete 9 and substitute therefor --10--.

Page 44, line 34, after "ends" insert --**12f** and **12g**--.

Page 45, line 36, before "see" insert --i.e. a surface or a side surface or a defined surface or a defined side surface,--.

Page 46, line 17, after "**15.**" insert --Thus, and as best shown in Fig. 19, between the formation of two particular adjacent slots **30**, the polymeric foamed material opening **15** (including slot **70**) was cut; and between the formation of the left extreme slot **30** and right extreme slot **30** in Fig. 19 (or the two opposed slots **30** respectively adjacent to channel **26** and tongue **24** in Fig. 19) the polymeric material opening **15** (including slot **70**) along with a slot **30** (i.e. the slot **30** between the left extreme slot **30** and the right extreme slot **30**) was cut or formed.--

Page 50, line 14, after "cutters." insert --If hot wires **58** are used as cutters for forming respective slots **30**, the walls or cut surfaces (i.e. cut surfaces $\mathbf{30w_c}$, $\mathbf{30f_c}$ and $\mathbf{30r_{1c}}$) would be seared surfaces.--

Page 50, line 28, delete "**4**" and substitute therefor --the--.

Page 53, line 35, delete "**125**" and substitute therefor --**12s**--.

Page 53, line 36, after "Fig. 20" insert --, including opposed cut surfaces $\mathbf{30r_{1c}}$-$\mathbf{30r_{1c}}$--

Page 54, line 3, after "Fig. 20" insert --, including opposed cut surfaces $\mathbf{30w_c}$-$\mathbf{30w_c}$--

Page 54, line 7, after "Fig. 20" insert --, including cut surface $\mathbf{12r_c}$--.

Page 54, line 11, after "Fig. 20" insert --, including opposed cut surfaces $\mathbf{30w_c}$-$\mathbf{30w_c}$.--

Page 54, line 14, after "$\mathbf{30r_1}$" insert --including opposed cut surfaces $\mathbf{30r_{1c}}$-$\mathbf{30r_{1c}}$ --.

Page 54, line 15, after "**30s**" insert --including opposed cut surfaces $\mathbf{30s_c}$-$\mathbf{30s_c}$--.

Page 54, line 16, after "**12r**" insert --including cut surfaces $\mathbf{12r_c}$--.

Page 54, line 27, after "$\mathbf{30r_1}$" insert --and against opposed cut surfaces $\mathbf{30r_{1c}}$ and $\mathbf{30r_{1c}}$--

Page 54, line 28, after "**12r**" insert --and against cut surface $\mathbf{12r_c}$--

Page 54, line 32, after "**30s**" insert --and against opposed cut surfaces $\mathbf{30w_c}$ and $\mathbf{30w_c}$--.

Page 55, line 21, after "Fig. 20" insert --, and respectively including opposed cut surfaces $\mathbf{30w_c}$ and $\mathbf{30w_c}$ and/or including opposed cut surfaces $\mathbf{30r_{1c}}$ and $\mathbf{30r_{1c}}$--

Page 55, line 35, after "Fig. 20" insert --including opposed cut surfaces $\mathbf{30r_{1c}}$ and $\mathbf{30r_{1c}}$--.

Page 56, line 5, after "Fig. 20" insert --, including opposed cut surfaces $\mathbf{30w_c}$ and $\mathbf{30w_c}$--.

Page 56, line 12, after "Fig. 20" insert --, and respectively including opposed cut surfaces $\mathbf{30w_c}$ and $\mathbf{30w_c}$ and/or including opposed cut surfaces $\mathbf{30r_{1c}}$ and $\mathbf{30r_{1c}}$--

Page 56, line 16, after "Fig. 20" insert --including opposed cut surfaces $\mathbf{30r_{1c}}$ and $\mathbf{30r_{1c}}$--.

Page 56, line 35, after "Fig. 20" insert -- including opposed cut surfaces $\mathbf{30r_{1c}}$ and $\mathbf{30r_{1c}}$--.

Page 57, line 1, after "Fig. 20" insert --, including opposed cut surfaces $\mathbf{30r_{1c}}$ and $\mathbf{30r_{1c}}$ (i.e. seared opposed cut surfaces)--.

Page 57, line 8, after "Fig. 20" insert --, including opposed cut surfaces $\mathbf{30w_c}$ and $\mathbf{30w_c}$--.

Page 57, line 23, "Fig. 20" insert --, including opposed cut surfaces $\mathbf{30w_c}$ and $\mathbf{30w_c}$--.

Page 57, line 29, "Fig. 20" insert --, including opposed cut surfaces $\mathbf{30w_c}$ and $\mathbf{30w_c}$--.

Page 57, line 36, "Fig. 20" insert --, including opposed cut surfaces $\mathbf{30w_c}$ and $\mathbf{30w_c}$--.

IN THE CLAIMS:

Please cancel claims 1-80 without prejudice and add the following claims:

81. A method for producing a polymeric foamed material panel comprising:

cutting a polymeric foamed material with a hot wire cutter in a first direction from a surface of the polymeric foamed material wherein the first direction is generally perpendicular to the surface;

cutting subsequently with the hot wire cutter the polymeric foamed material in a second direction generally perpendicular to the first direction to produce a first cut seared surface terminating in opposed ends of said polymeric foamed material;

cutting subsequently with the hot wire cutter the polymeric foamed material in a third direction generally perpendicular to the second direction to produce a second cut seared surface terminating in said opposed ends of said polymeric foamed material;

providing a brace member having a web and at least one flange secured to the web; and

disposing respectively the web and the flange of the brace member against the first cut seared surface and the second cut seared surface to produce a polymeric foamed material panel.

82. The method of Claim 81 additionally comprising cutting with said hot wire cutter said polymeric foamed material to produce a defined planar surface; and said surface is a defined side surface of the polymeric foamed material.

83. The method of Claim 82 wherein said second direction is a generally perpendicular direction from said defined planar surface.

84. The method of Claim 81 additionally comprising forming a flange-return slot in said polymeric foamed material; and said providing a brace member comprises providing said brace member to additionally have a flange return secured to said flange.

85. The method of Claim 83 additionally comprising forming a flange-return slot in said polymeric foamed material; and said providing a brace member comprises providing said brace member to additionally have a flange return secured to said flange.

86. The method of Claim 84 additionally comprising disposing said flange return of said brace member in said flange-return slot in said polymeric foamed material.

87. The method of Claim 85 additionally comprising disposing said flange return of said brace member in said flange-return slot in said polymeric foamed material.

88. The method of Claim 81 additionally comprising cutting with the hot wire cutter the polymeric foamed material to produce a third cut seared surface terminating in said opposed ends of said polymeric foamed material; and cutting with the hot wire cutter the polymeric foamed material to produce a fourth cut seared surface terminating in said opposed ends of said polymeric foamed material.

89. The method of Claim 86 additionally comprising cutting with the hot wire cutter the polymeric foamed material to produce a third cut seared surface terminating in said opposed ends of said polymeric foamed material; and cutting with the hot wire cutter the polymeric foamed material to produce a fourth cut seared surface terminating in said opposed ends of said polymeric foamed material.

90. The method of Claim 88 additionally comprising providing a second brace member having a second web and at least one second flange secured to the second web; and disposing respectively the second web and the second flange of the second brace member against the fourth cut seared surface and the third cut seared surface.

91. The method of Claim 89 additionally comprising providing a second brace member having a second web and at least one second flange secured to the second web; and disposing respectively the second web and the second flange of the second brace member against the fourth cut seared surface and the third cut seared surface.

92. The method of Claim 88 wherein said fourth cut seared surface is generally perpendicular to said third cut seared surface.

93. The method of Claim 91 wherein said fourth cut seared surface is generally perpendicular to said third cut seared surface.

94. The method of Claim 90 additionally comprising forming a second flange-return slot in said polymeric foamed material; and said providing a second brace member comprises providing said second brace member to additionally have a second flange return secured to said second flange.

95. The method of Claim 91 additionally comprising forming a second flange-return slot in said polymeric foamed material; and said providing a second brace member comprises providing said second brace member to additionally have a second flange return secured to said second flange.

96. The method of Claim 94 additionally comprising disposing said second flange return of said second brace member in said second flange-return slot in said polymeric foamed material.

97. The method of Claim 95 additionally comprising disposing said second flange return of said second brace member in said second flange-return slot in said polymeric foamed material.

98. The method of Claim 82 wherein said brace member having a web and at least one flange secured to the web comprises said brace member having said web, a first flange secured to said web, and a second flange secured to said web; and said disposing additionally comprises respectively positioning the web and the first flange of the brace member against the first cut seared surface and the second cut seared surface such that said second flange is generally aligned with the defined planar surface of the polymeric foamed material.

99. The method of Claim 98 additionally comprising forming a first flange-return slot in the polymeric foamed material and forming a second flange-return slot in the polymeric foamed material; said brace member additionally comprises a first flange return secured to said first flange and a second flange return secured to said second flange; and said disposing additionally comprises respectively positioning said first flange return and

104. The method of Claim 91 wherein a portion of the web of the brace member and a portion of the second web of the second brace member protrude from the polymeric foamed material panel.

105. The method of Claim 103 additionally comprising securing a track member to the brace member.

106. The method of Claim 104 additionally comprising securing a track member to the brace member and to the second brace member.

107. The method of Claim 81 additionally comprising cutting the polymeric foamed material with the hot wire cutter to produce the polymeric foamed material having a tongue and a channel.

108. The method of Claim 98 additionally comprising cutting the polymeric foamed material with the hot wire cutter to produce the polymeric foamed material having a tongue and a channel; and said cutting subsequently with the hot wire cutter the polymeric foamed material in said second direction additionally producing an opposed first cut seared surface terminating in said opposed ends of said polymeric foamed material and opposed to said first cut seared surface such that said opposed first cut seared surface and said first cut seared surface form a first slot wherein said web of said brace member lodges; and said cutting subsequently with the hot wire cutter the polymeric foamed material in said third direction additionally producing an opposed second cut seared surface terminating in said opposed ends of said polymeric foamed material and opposed to said second cut seared surface such that said opposed second cut seared surface and said second cut seared surface form a second slot wherein said flange of said brace member lodges.

109. The method of Claim 102 additionally comprising cutting the polymeric foamed material with the hot wire cutter to produce the polymeric foamed material having a tongue and a channel.

110. The method of Claim 81 additionally comprising computer operating said hot wire cutter; and said polymeric foamed material is generally stationary.

111. The method of Claim 98 additionally comprising computer operating said hot wire cutter; and said polymeric foamed material is generally stationary.

112. The method of Claim 109 additionally comprising computer operating said hot wire cutter; and said polymeric foamed material is generally stationary.

113. A polymeric foamed material panel produced in accordance with the method of Claim 81.

114. A polymeric foamed material panel produced in accordance with the method of Claim 90.

115. A polymeric foamed material panel produced in accordance with the method of Claim 99.

116. A polymeric foamed material panel produced in accordance with the method of Claim 102.

117. A polymeric foamed material panel produced in accordance with the method of Claim 103.

118. A polymeric foamed material panel produced in accordance with the method of Claim 104.

119. A polymeric foamed material panel produced in accordance with the method of Claim 112.

120. A method for producing a plurality of polymeric foamed material structures having seared surfaces for contacting brace members comprising the steps of:

a) providing a block of polymeric foamed material having a side and a pair of opposed ends;

b) cutting the block of polymeric foamed material with a plurality of hot wire cutters in a first direction generally perpendicular from said side of said block of polymeric foamed material;

c) cutting, immediately after said cutting step (b), the block of polymeric foamed material with the plurality of hot wire cutters in a second direction generally perpendicular from said first direction until each hot wire cutter forms in the polymeric foamed material a first respective cut seared surface terminating in said opposed ends of said block of polymeric foamed material;

d) cutting, immediately after said cutting step (c), the block of polymeric foamed material with the plurality of hot wire cutters in a third direction generally perpendicular from said second direction until each hot wire cutter forms in the polymeric foamed material a second respective cut seared surface terminating in said opposed ends of said block of said polymeric foamed material;

e) cutting the block of polymeric foamed material with the plurality of hot wire cutters in a fourth direction until each hot wire cutter forms in the polymeric foamed material a third respective cut seared surface terminating in said opposed ends of said block of polymeric foamed material;

f) cutting the block of polymeric foamed material with the plurality of hot wire cutters in a fifth direction until each hot wire cutter forms in the polymeric foamed material a fourth respective cut seared surface terminating in said opposed ends of said block of polymeric foamed material; and

g) cutting the block of polymeric foamed material with the plurality of hot wire cutters in a sixth direction to produce a plurality of polymeric foamed material structures, each of said polymeric foamed material structures having a first cut seared surface and a second cut seared surface for contacting a first brace member and a third cut seared surface and a fourth cut seared surface for contacting a second brace member.

121. The method of Claim 120 additionally comprising cutting the block of polymeric foamed material with the plurality of hot wire cutters between said cutting step (d) and said cutting step (e).

122. The method of Claim 120 additionally comprising cutting the block of polymeric foamed material with the plurality of hot wire cutters such that each of said polymeric foamed material structures has a tongue member and a channel member.

123. The method of Claim 121 additionally comprising cutting the block of polymeric foamed material with the plurality of hot wire cutters such that each of said polymeric foamed material structures has a tongue member and a channel member.

124. The method of Claim 120 wherein said cutting step (f) is before said cutting step (e).

125. The method of Claim 123 wherein said cutting step (g) is after said cutting step (f).

126. The method of Claim 121 additionally comprising computer operating said hot wire cutters; and said block of polymeric foamed material is generally stationary; and said cutting step (c) additionally producing an opposed first respective cut seared surface terminating in said opposed ends of said block of polymeric foamed material and opposed to said first respective cut seared surface to form a first slot in each of said polymeric foamed material structures; and said cutting step (d) additionally producing an opposed second respective cut seared surface terminating in said opposed ends of said block of polymeric foamed material and opposed to said second respective cut seared surface to form a second slot in each of said polymeric foamed material structures, each of said polymeric foamed material structures having said first slot and said second slot for receiving a first brace member; and said cutting step (e) additionally producing an opposed third respective cut seared surface terminating in said opposed ends of said block of polymeric foamed material and opposed to said third respective cut seared surface to form a third slot in each of said polymeric foamed material structures; and said cutting step (f) additionally producing an

opposed fourth respective cut seared surface terminating in said opposed ends of said block of polymeric foamed material and opposed to said fourth respective cut seared surface to form a fourth slot in each of said polymeric foamed material structures, each of said polymeric foamed material structures having said third slot and said fourth slot for receiving a second brace member.

127. The method of Claim 124 additionally comprising computer operating said hot wire cutters; and said block of polymeric foamed material is generally stationary; and said fifth direction is generally perpendicular from said fourth direction; and said sixth direction is generally perpendicular from said fifth direction.

128. The method of Claim 120 additionally comprising forming a first-return slot, a second flange-return slot, a third flange-return slot, and a fourth flange-return slot in each of the polymeric foamed material structures.

129. The method of Claim 124 additionally comprising forming a first-return slot, a second flange-return slot, a third flange-return slot, and a fourth flange-return slot in each of the polymeric foamed material structures.

130. The method of Claim 128 additionally comprising providing a plurality of first brace members wherein each of said first brace members comprises a first web, a first flange secured to said first web, a first flange return secured to said first flange, a second flange secured to said web, and a second flange return secured to said second flange; and additionally comprising providing a plurality of second brace members wherein each of said second brace members comprises a second web, a third flange secured to said second web, a third flange return secured to said third flange, a fourth flange secured to said second web, a fourth flange return secured to said fourth flange; and disposing the plurality of the first brace members and the plurality of the second brace members in the plurality of polymeric foamed material structures such that each of said polymeric foamed material structures comprises the first web of the first brace member positioned against the first cut seared surface, the first flange positioned against the second cut secured surface, the first flange return positioned in the first flange-return slot, the second flange return positioned in

the second flange-return slot, the second web of the second brace member positioned against the fourth cut seared surface, the third flange positioned against the third cut seared surface, the third flange return positioned in the third flange-return slot, and the fourth flange return positioned in the fourth flange-return slot.

131. The method of Claim 129 additionally comprising providing a plurality of first brace members wherein each of said first brace members comprises a first web, a first flange secured to said first web, a first flange return secured to said first flange, a second flange secured to said web, and a second flange return secured to said second flange; and additionally comprising providing a plurality of second brace members wherein each of said second brace members comprises a second web, a third flange secured to said second web, a third flange return secured to said third flange, a fourth flange secured to said second web, a fourth flange return secured to said fourth flange; and disposing the plurality of the first brace members and the plurality of the second brace members in the plurality of polymeric foamed material structures such that each of said polymeric foamed material structures comprises the first web of the first brace member positioned against the first cut seared surface, the first flange positioned against the second cut secured surface, the first flange return positioned in the first flange-return slot, the second flange return positioned in the second flange-return slot, the second web of the second brace member positioned against the fourth cut seared surface, the third flange positioned against the third cut seared surface, the third flange return positioned in the third flange-return slot, and the fourth flange return positioned in the fourth flange-return slot.

132. The method of Claim 130 additionally comprising cutting the block of polymeric foamed material prior to said cutting step (g).

133. The method of Claim 130 additionally comprising cutting the block of polymeric foamed material after said cutting step (g) and prior to disposing the plurality of the first brace members and the plurality of the second brace members in the plurality of polymeric foamed material structures.

134. A plurality of polymeric foamed material structures produced in accordance with the method of Claim 120.

135. A plurality of polymeric foamed material structures produced in accordance with the method of Claim 130.

136. A plurality of polymeric foamed material structures produced in accordance with the method of Claim 131.

137. A method for producing a polymeric foamed material panel comprising the steps of:

a) obtaining a polymeric foamed material structure produced in accordance with a method comprising:

cutting a polymeric foamed material with a cutter in a first direction from a side of the polymeric foamed material wherein the first direction is generally perpendicular to the side and said cutter is selected from the group consisting of a hot wire cutter and a laser cutter;

cutting subsequently with the cutter the polymeric foamed material in a second direction from the first direction to produce a first cut surface terminating in opposed ends of said polymeric foamed material;

cutting subsequently with the cutter the polymeric foamed material in a third direction from the second direction to produce a second cut surface terminating in said opposed ends of said polymeric foamed material; and

b) providing a brace member having a web and at least one flange secured to the web; and

c) disposing the brace member in the polymeric foamed material structure such that the web is against the first cut surface and the flange is against the second cut surface to produce a polymeric foamed material panel.

138. The method of Claim 137 wherein said second direction is generally perpendicular from the first direction.

139. The method of Claim 137 wherein said third direction is generally perpendicular from the second direction.

140. The method of Claim 138 wherein said third direction is generally perpendicular from the second direction.

141. The method of Claim 137 wherein said method in obtaining step (a) for producing said polymeric foamed material structure additionally comprises cutting the polymeric foamed material with the cutter to produce the polymeric foamed material having a tongue and a channel.

142. The method of Claim 140 wherein said method in obtaining step (a) for producing said polymeric foamed material structure additionally comprises cutting the polymeric foamed material with the cutter to produce the polymeric foamed material having a tongue and a channel.

143. The method of Claim 137 wherein said brace member comprises a generally C-shape.

144. The method of Claim 140 wherein said brace member comprises a generally C-shape.

145. The method of Claim 141 wherein said brace member comprises a generally C-shape.

146. The method of Claim 137 wherein said brace member comprises a generally Z-shape.

147. The method of Claim 141 wherein said brace member comprises a generally Z-shape.

148. The method of Claim 57 wherein a portion of the web of the brace member protrudes from the polymeric foamed material panel.

149. The method of Claim 140 wherein a portion of the web of the brace member protrudes from the polymeric foamed material panel.

150. The method of Claim 146 wherein a portion of the web of the brace member protrudes from the polymeric foamed material panel.

151. The method of Claim 137 wherein said method in obtaining step (a) for producing said polymeric foamed material structure additionally comprising forming, prior to said disposing step (c), a flange-return slot in the polymeric foamed material; and said providing a brace member comprises providing said brace member to additionally have a flange return secured to said flange.

152. The method of Claim 141 wherein said method in obtaining step (a) for producing said polymeric foamed material structure additionally comprising forming, prior to said disposing step (c), a flange-return slot in the polymeric foamed material; and said providing a brace member comprises providing said brace member to additionally have a flange return secured to said flange.

153. The method of Claim 151 additionally comprising disposing said flange return of said brace member in said flange-return slot in said polymeric foamed material structure.

154. The method of Claim 152 additionally comprising disposing said flange return of said brace member in said flange-return slot in said polymeric foamed material structure.

155. The method of Claim 137 wherein said method in said obtaining step (a) for producing said polymeric foamed material structure additionally comprising cutting with the cutter the polymeric foamed material to produce a third cut surface terminating in said opposed ends of said polymeric foamed material; and cutting with the cutter the polymeric foamed material to produce a fourth cut surface terminating in said opposed ends of said polymeric foamed material.

156. The method of Claim 141 wherein said method in said obtaining step (a) for producing said polymeric foamed material structure additionally comprising cutting with the cutter the polymeric foamed material to produce a third cut surface terminating in said opposed ends of said polymeric foamed material; and cutting with the cutter the polymeric foamed material to produce a fourth cut surface terminating in said opposed ends of said polymeric foamed material.

157. The method of Claim 155 additionally comprising providing a second brace member having a second web and at least one second flange secured to the second web; and disposing respectively the second web and the second flange of the second brace member against the fourth cut surface and the third cut surface.

158. The method of Claim 156 additionally comprising providing a second brace member having a second web and at least one second flange secured to the second web; and disposing respectively the second web and the second flange of the second brace member against the fourth cut surface and the third cut surface.

159. The method of Claim 137 wherein said method in obtaining step (a) for producing said polymeric foamed material structure additionally comprising computer operating said cutter; and said polymeric foamed material is generally stationary; and said side is a defined surface of the polymeric foamed material.

160. A method for producing a polymeric foamed material panel comprising the steps of:

a) providing a polymeric foamed material structure comprising a pair of opposed ends, a side surface, a first hotwire-cut seared surface having been cut by a hotwire cutter in a first direction relative to said side surface and terminating in said pair of opposed ends, a second hotwire-cut seared surface having been cut by a hotwire cutter in a second direction from said first hotwire-cut seared surface and terminating in said pair of opposed ends, and a third hotwire-cut seared surface having been cut by a hotwire cutter in a

third direction from said second hotwire-cut seared surface and terminating in said pair of opposed ends;

b) providing a brace member having a web and at least one flange secured to the web; and

c) disposing respectively the web and the flange of the brace member against the second hotwire-cut seared surface and the third hotwire-cut seared surface to produce a polymeric foamed material panel.

161. The method of Claim 160 wherein said first direction is generally perpendicular to said side surface.

162. The method of Claim 160 wherein said brace member comprises a generally C-shape.

163. The method of Claim 160 wherein said brace member comprises a generally Z-shape.

164. The method of Claim 162 wherein a portion of the web of the brace member protrudes from the polymeric foamed material panel.

165. A polymeric foamed material panel produced in accordance with the method of Claim 160.

166. A method for forming a structure comprising the steps of:

a) cutting a first polymeric foamed material with a first cutter in a first direction relative to a first side surface of the first polymeric foamed material;

b) cutting with the first cutter the first polymeric foamed material in a second direction relative to the first direction to produce a first-cutter first cut surface terminating in opposed ends of said first polymeric foamed material;

c) cutting with the first cutter the first polymeric foamed material in a third direction relative to the second direction to produce a first-cutter second cut surface terminating in said opposed ends of said first polymeric foamed material;

d) cutting the first polymeric foamed material with the first cutter to produce a first tongue in the first polymeric foamed material;

e) providing a first brace member having a first web and at least one first flange secured to the first web;

f) disposing respectively the first web and the first flange of the first brace member against the first-cutter first cut surface of step (b) and the first-cutter second cut surface of step (c) to produce a first polymeric foamed material panel having said first tongue;

g) cutting a second polymeric foamed material with a second cutter to produce a second channel in the second polymeric foamed material;

h) cutting the second polymeric foamed material with the second cutter in a first direction relative to a second side surface of the second polymeric foamed material;

i) cutting with the second cutter the second polymeric foamed material in a second direction relative to the first direction to produce a second-cutter first cut surface terminating in opposed ends of said second polymeric foamed material;

j) cutting with the second cutter the second polymeric foamed material in a third direction relative to the second direction to produce a second-cutter second cut surface terminating in said opposed ends of said second polymeric foamed material;

k) providing a second brace member having a second web and at least one second flange secured to the second web;

l) disposing respectively the second web and the second flange of the second brace member against the second-cutter first cut surface of step (i) and the second-cutter second cut surface of step (j) to produce a second polymeric foamed material panel having said second channel; and

m) sliding said first tongue of said first polymeric foamed material panel into said second channel of said second polymeric foamed material panel to form a structure.

167. The method of Claim 166 additionally comprising cutting the first polymeric foamed material with the first cutter to produce a first channel in the polymeric

foamed material and cutting the second polymeric foamed material with the second cutter to produce a second tongue in the second polymeric foamed material.

168. The method of Claim 166 wherein said first direction of step (a) is generally perpendicular to the first side surface of step (a); said second direction of step (b) is generally perpendicular to said first direction of step (a); said third direction step (c) is generally perpendicular to said second direction of step (b); and wherein said first direction of step (h) is generally perpendicular to the second side surface of step (h); said second direction of step (i) is generally perpendicular to said first direction of step (h); said third direction of step (j) is generally perpendicular to said second direction of step (i).

169. The method of Claim 167 wherein said first direction of step (a) is generally perpendicular to the first side surface of step (a); said second direction of step (b) is generally perpendicular to said first direction of step (a); said third direction step (c) is generally perpendicular to said second direction of step (b); and wherein said first direction of step (h) is generally perpendicular to the second side surface of step (h); said second direction of step (i) is generally perpendicular to said first direction of step (h); said third direction of step (j) is generally perpendicular to said second direction of step (i).

170. The method of Claim 166 additionally comprising cutting respectively said first polymeric foamed material with said first cutter in said cutting steps (a) through (d) generally simultaneously with cutting respectively said second polymeric foamed material with said second cutter in said cutting steps (g) through (j).

171. The method of Claim 166 wherein said cutting step (b) additionally producing an opposed first-cutter first cut surface terminating in said opposed ends of said first polymeric foamed material and opposed to said first-cutter first cut surface to form a first-cutter first slot in said first polymeric foamed material; and said cutting step (c) additionally producing an opposed first-cutter second cut surface terminating in said opposed ends of said first polymeric foamed material and opposed to said first-cutter second cut surface to form a first-cutter second slot in said first polymeric foamed material such that after said disposing step (f) said first web and said first flange of said first brace member are

further disposed respectively in said first-cutter first slot and in said first-cutter second slot; and said cutting step (i) additionally producing an opposed second-cutter first cut surface terminating in said opposed ends of said second polymeric foamed material and opposed to said second-cutter first cut surface to form a second-cutter first slot in said second polymeric foamed material; and said cutting step (j) additionally producing an opposed second-cutter second cut surface terminating in said opposed ends of said second polymeric foamed material and opposed to said second-cutter second cut surface to form a second-cutter second slot in said second polymeric foamed material such that after said disposing step (l) said second web and said second flange of said second brace member are further disposed respectively in said second-cutter first slot and in second-cutter second slot.

172. The method of Claim 166 wherein said second cutter and said first cutter are respectively a cutter selected from the group consisting of a hotwire cutter and a laser cutter.

173. The method of Claim 166 wherein said first brace member comprises a generally C-shape, and a portion of the first web of the first brace member protrudes from the first polymeric foamed material panel.

174. A structure produced in accordance with the method of Claim 166.

175. A method for forming a structure comprising the steps of:

a) providing a first polymeric foamed material structure comprising a pair of opposed first ends, a first defined side surface, a first tongue, a first hotwire-cut seared surface having been cut by a hotwire cutter in a first direction relative to said first defined side surface and terminating in said pair of opposed first ends, a second hotwire-cut seared surface having been cut by a hotwire cutter in a second direction from said first hotwire-cut seared surface and terminating in said pair of opposed first ends, and a third hotwire-cut seared surface having been cut by a hotwire cutter in a third direction from said second hotwire-cut seared surface and terminating in said pair of opposed first ends;

b) providing a first brace member having a first web and at least one first flange secured to the web;

c) disposing respectively the first web and the first flange of the first brace member against the second hotwire-cut seared surface of step (a) and the third hotwire-cut seared surface of step (a) to produce a first polymeric foamed material panel having said first tongue;

d) providing a second polymeric foamed material structure comprising a pair of opposed second ends, a second defined side surface, a second channel, a first hotwire-cut seared surface having been cut by a hotwire cutter in a first direction relative to said second defined side surface and terminating in said pair of opposed second ends, a second hotwire-cut seared surface having been cut by a hotwire cutter in a second direction from said first hotwire-cut seared surface and terminating in said pair of opposed second ends, and a third hotwire-cut seared surface having been cut by a hotwire cutter and in a third direction from said second hotwire-cut seared surface and terminating in said pair of opposed second ends;

e) providing a second brace member having a second web and at least one second flange secured to the web;

f) disposing respectively the second web and the second flange of the second brace member against the second hotwire-cut seared surface of step (d) and the third hotwire-cut seared surface of step (d) to produce a second polymeric foamed material panel having said second channel; and

g) disposing said first tongue of said first polymeric foamed material panel into said second channel of said second polymeric foamed material panel to form a structure.

176. A structure formed in accordance with the method of Claim 175.

177. A method for producing a plurality of polymeric foamed material panels comprising the steps of:

a) cutting a polymeric foamed material with a plurality of cutters in a generally perpendicular direction from a defined surface of the polymeric foamed material;

b) cutting in at least a second direction the polymeric foamed material of step (a) with the plurality of cutters until each cutter forms in the polymeric foamed material a first respective slot terminating in opposed ends of the polymeric foamed material;

c) cutting with the plurality of cutters the polymeric foamed material of step (b) in said generally perpendicular direction of step (a) to produce a plurality of polymeric foamed material structures having first slots; and

d) disposing first brace members in the first slots of the polymeric foamed material structures of step (c) to produce a plurality of polymeric foamed material panels with each polymeric foamed material panel having one of said first brace members.

178. The method of Claim 177 wherein said first brace members each comprise a generally C-shape, and said defined surface is a side of said polymeric foamed material.

179. The method of Claim 178 wherein each of first brace members include a web a portion which protrudes from said polymeric foamed material panel.

180. A plurality of polymeric foamed material panels produced in accordance with the method of Claim 177.

181. The method of Claim 177 additionally comprising cutting the polymeric foamed material with the plurality of cutters until each cutter forms a second respective slot in the polymeric foamed material and said produced plurality of polymeric foamed material structures include second slots.

182. The method of Claim 181 additionally comprising disposing second brace members in the second slots of the produced polymeric foamed material structures such that each polymeric foamed material panel includes one of said second brace members.

183. A method for producing a plurality of polymeric foamed material panels comprising the steps of:

a) providing a block of polymeric foamed material in a generally stationary position having a defined surface and a pair of opposed ends;

b) moving from said defined surface a plurality of cutters through the generally stationary block of polymeric foamed material of step (a) in a generally perpendicular direction of travel;

c) interrupting the movement of the plurality of cutters from said generally perpendicular direction of travel through the generally stationary blocks of polymeric foamed material to move the cutters in at least one direction of travel which differs from said generally perpendicular direction of travel such that each cutter produces a respective brace-receiving slot in the polymeric foamed material terminating in said opposed ends;

d) continuing said moving step (b) of said plurality of cutters in said generally perpendicular direction of travel, while intermittently interrupting the movement of the plurality of cutters from generally perpendicular direction of travel to move the cutters in at least one direction of travel which differs from said generally perpendicular direction of travel such that each cutter produces at least one additional respective brace-receiving slot in the polymeric foamed material, until said plurality of cutters have moved completely through the generally stationary block of polymeric foamed material after which a plurality of polymeric foamed material structures are produced with each polymeric foamed material structure having a plurality of brace-receiving slots; and

e) disposing brace members into the brace-receiving slots of the polymeric foamed material structures of step (d) to produce a plurality of polymeric foamed material panels with each polymeric foamed material panel having two of said brace members.

184. A plurality of polymeric foamed material panels produced in accordance with the method of Claim 183.

185. The method of Claim 183 wherein said defined surface comprises a side of said block of polymeric foamed material.

186. A method for producing a plurality of polymeric foamed material panels comprising the steps of:

a) cutting a polymeric foamed material in a first direction with a plurality of cutters generally moving in unison;

b) cutting subsequently the polymeric foamed material of step (a) in a second direction with said plurality of cutters generally moving in unison;

c) cutting, after said cutting step (b), the polymeric foamed material of step (b) in said first direction with said plurality of cutters generally moving in unison;

d) cutting, after said cutting step (c), the polymeric foamed material of step (c) in a third direction with said plurality of cutters generally moving in unison;

e) cutting, after said cutting step (d), the polymeric foamed material of step (d) in said first direction with said plurality of cutters generally moving in unison until said cutters have cut through the polymeric foamed material of step (d) to produce a plurality of polymeric foamed material structures having brace-receiving configurations; and

f) sliding brace members into the brace-receiving configurations of said polymeric foamed material structures of step (e) to produce a plurality of polymeric foamed material panels with each polymeric foamed material panel having one of said brace members.

187. A plurality of polymeric foamed material panels produced in accordance with the method of Claim 186.

188. A method for producing a plurality of polymeric foamed material panels comprising the steps of:

a) providing a block of polymeric foamed material having a defined surface and a pair of opposed ends;

b) moving from said defined surface a plurality of cutters through the block of polymeric foamed material in a generally perpendicular direction of travel, while

interrupting at least one time the moving of the plurality of cutters in said generally perpendicular direction of travel to move the cutters through the block of polymeric foamed material in at least one direction of travel which differs from said generally perpendicular direction of travel, such that each cutter produces a respective brace-receiving slot in the polymeric foamed material terminating in said opposed ends, until said plurality of cutters have moved completely through the block of polymeric foamed material to produce a plurality of polymeric foamed material structures with each structure having at least one brace-receiving slot; and

c) disposing a brace member into each brace-receiving slot of said polymeric foamed material structures to produce a plurality of polymeric foamed material panels with each of said polymeric foamed material panels having at least one brace member.

189. The method of Claim 188 wherein said defined surface is a side surface of said block of polymeric foamed material.

190. A plurality of polymeric foamed material panels produced in accordance with the method of Claim 188.

191. A method for producing a polymeric foamed material panel comprising the steps of:

a) providing a block of polymeric foamed material having a defined surface and a pair of opposed ends;

b) cutting the block of polymeric foamed material in a first direction relative to the defined surface;

c) cutting the block of polymeric foamed material in a second direction to produce a first slot including a first cut surface terminating in said opposed ends;

d) cutting the block of polymeric foamed material from said first slot to produce a second slot communicating with the first slot and including a second cut surface terminating in said opposed ends; and

e) disposing a brace member against said first cut surface and said second cut surface respectively in said first slot and in said second slot to produce a polymeric foamed material panel.

192. A polymeric foamed material panel produced in accordance with the method of Claim 191.

193. A method for producing a polymeric foamed material panel comprising the steps of:

a) providing a polymeric foamed material having a pair of opposed ends;

b) cutting the block of polymeric foamed material in a first direction to produce a defined planar surface;

c) cutting the block of polymeric foamed material from said defined planar surface in a second direction relative to said first direction to produce a web-receiving slot including a web-contacting cut surface terminating in said opposed ends;

d) cutting the block of polymeric foamed material in at least one third direction from said web-receiving slot to produce a flange-receiving slot including a flange-contacting cut surface terminating in said opposed ends;

e) providing a brace member having a web, and a first flange and a second flange integrally secured to the web; and

f) disposing respectively said web and said first flange of said brace member against said web-contacting cut surface in said web-receiving slot and against said flange-contacting cut surface in said flange-receiving slot to produce a polymeric material panel having said second flange of said brace member generally aligned with said defined planar surface.

194. A polymeric foamed material panel produced in accordance with the method of Claim 193.

195. A method for producing a polymeric foamed material structure comprising the steps of:

a) providing a block of polymeric foamed material having a pair of opposed ends;

b) cutting the block of polymeric foamed material in a first direction;

c) cutting the block of polymeric foamed material in a second direction to produce a first cut surface terminating in said opposed ends;

d) cutting the block of polymeric foamed material from said first cut surface to produce a second cut surface terminating in said opposed ends;

e) providing a brace member having a web, a first flange secured to the web, and a second flange secured to the web; and

f) disposing the web and the first flange of the brace member respectively against the first cut surface and the second cut surface to produce a polymeric foamed material structure.

196. The method of Claim 195 wherein said first cut surface and said second cut surface respectively comprise a first cut seared surface and a second cut seared surface produced by a hotwire cutter.

197. The method of Claim 195 wherein said providing step (a) additionally comprises providing the block of polymeric foamed material to have a defined surface, and cutting in said cutting step (b) is in said first direction which is generally perpendicular to said defined surface and produces a defined planar surface; and said disposing step (f) additionally comprises generally aligning the second flange with said defined planar surface.

198. A polymeric foamed material structure produced in accordance with the method of Claim 195.

199. A method for producing a plurality of polymeric foamed material structures having slot sections for receiving stud members comprising the steps of:

a) cutting a polymeric foamed material with a plurality of cutters in a generally perpendicular direction from a side of the polymeric foamed material;

b) cutting subsequently in at least a second direction the polymeric foamed material of step (a) with the plurality of cutters until each cutter forms a first respective slot section in the polymeric foamed material, said first respective

slot section terminating in opposed ends of the polymeric foamed material; and

c) cutting in said generally perpendicular direction of step (a) the polymeric foamed material with the plurality of cutters to produce a plurality of polymeric foamed material structures having a plurality of first slot sections, with each polymeric foamed material structure having one of the first slot sections.

200. The method of Claim 199 wherein said plurality of cutters move generally simultaneously.

201. The method of Claim 199 wherein said polymeric foamed material of step (a), step (b) and step (c) is generally stationary.

202. The method of Claim 200 wherein said polymeric foamed material of step (a), step (b) and step (c) is generally stationary.

203. The method of Claim 199 wherein said at least one second direction comprises a second direction generally perpendicular to said generally perpendicular direction of step (a).

204. The method of Claim 202 wherein said at least one second direction comprises a second direction generally perpendicular to said generally perpendicular direction of step (a).

205. The method of Claim 199 additionally comprising cutting with the plurality of cutters, before said cutting step (c) and after said cutting step (b), the polymeric foamed material in said generally perpendicular direction of step (a) until each cutter forms a second respective slot section in the polymeric foamed material, said second respective slot section communicating with said first perspective slot section and terminating in opposed ends of the polymeric foamed material; and said cutting step (c) subsequently produces a plurality of polymeric foamed material structures having a plurality of first slot sections and a plurality of second slot sections, with each polymeric foamed material structure having one of the first slot sections and one of the second slot sections.

206. The method of Claim 204 additionally comprising cutting with the plurality of cutters, before said cutting step (c) and after said cutting step (b), the polymeric foamed material in said generally perpendicular direction of step (a) until each cutter forms a

second respective slot section in the polymeric foamed material, said second respective slot section communicating with said first perspective slot section and terminating in opposed ends of the polymeric foamed material; and said cutting step (c) subsequently produces a plurality of polymeric foamed material structures having a plurality of first slot sections and a plurality of second slot sections, with each polymeric foamed material structure having one of the first slot sections and one of the second slot sections.

207. The method Claim 199 additionally comprising cutting with the plurality of cutters, before said cutting step (c) and after said cutting step (b), the polymeric foamed material in said generally perpendicular direction of step (a) and subsequently in a fourth direction until each cutter forms a second respective slot section and a third respective slot section in the polymeric foamed material, said second respective slot section communicating with said first respective slot section and terminating in opposed ends of the polymeric foamed material and said third respective slot section communicating with said second respective slot section and terminating in opposed ends of the polymeric foamed material; and said cutting step (c) subsequently produces a plurality of polymeric foamed material structures having a plurality of first slot sections, a plurality of second slot sections, and a plurality of third slot sections, with each polymeric foamed material structure having one of the first slot sections, one of the second slot sections, and one of the third slot sections.

208. The method of Claim 204 additionally comprising cutting with the plurality of cutters, before said cutting step (c) and after said cutting step (b), the polymeric foamed material in said generally perpendicular direction of step (a) and subsequently in a fourth direction until each cutter forms a second respective slot section and a third respective slot section in the polymeric foamed material, said second respective slot section communicating with said first respective slot section and terminating in opposed ends of the polymeric foamed material and said third respective slot section communicating with said second respective slot section and terminating in opposed ends of the polymeric foamed material; and said cutting step (c) subsequently produces a plurality of polymeric foamed material structures having a plurality of first slot sections, a plurality of second slot sections, and a plurality of third slot sections, with each polymeric foamed material structure having one of the first slot sections, one of the second slot sections, and one of the third slot sections.

209. The method of Claim 199 wherein said plurality of cutters comprise hot wire cutters.

210. The method of Claim 199 wherein said plurality of cutters comprise laser cutters.

211. The method of Claim 206 additionally comprising computer operating said plurality of cutters, and said plurality of cutters are selected from the group consisting of hot wire cutters and laser cutters.

212. The method of Claim 208 additionally comprising computer operating said plurality of cutters, and said plurality of cutters are selected from the group consisting of hot wire cutters and laser cutters.

213. The method of Claim 209 additionally comprising computer operating said plurality of hot wire cutters.

214. The method of Claim 210 additionally comprising computer operating said plurality of laser cutters.

215. The method of Claim 199 additionally comprising providing a plurality of stud members, and disposing the plurality of stud members in said first slot sections of said polymeric foamed material structures to produce a plurality of polymeric foamed material panels, with each polymeric foamed material panel having one of the stud members.

216. The method of Claim 205 additionally comprising providing a plurality of stud members, and disposing the plurality of stud members in said first slot sections and in said second slot sections of said polymeric foamed material structures to provide a plurality of polymeric foamed material panels, with each polymeric foamed material panel having one of the stud members.

217. The method of Claim 207 additionally comprising providing a plurality of stud members, and disposing the plurality of stud members in said first slot sections and in said second slot sections and in said third slot sections of said polymeric foamed material structures to produce a plurality of polymeric foamed material panels, with each of the polymeric foamed material panels having one of the stud members respectively occupying the first slot section, the second slot section and the third slot section associated with said each of the polymeric foamed material panels.

218. The method of Claim 208 additionally comprising providing a plurality of stud members, and disposing the plurality of stud members in said first slot sections and in said second slot sections and in said third slot sections of said polymeric foamed material structures to produce a plurality of polymeric foamed material panels, with each of the polymeric foamed material panels having one of the stud members respectively occupying the first slot section, the second slot section and the third slot section associated with said each of the polymeric foamed material panels.

219. The method of Claim 218 additionally comprising computer operating said plurality of cutters, and said plurality of cutters are selected from the group consisting of hot wire cutters and laser cutters.

220. A method for producing a plurality of polymeric foamed material structures having slots for receiving stud members comprising the steps of:

a) cutting a polymeric foamed material with a plurality of cutters in a generally perpendicular direction from a side surface of the polymeric foamed material;

b) cutting subsequently in at least a second direction the polymeric foamed material of step (a) with the plurality of cutters until each cutter forms a first respective slot in the polymeric foamed material, said first respective slot terminating in opposed ends of the polymeric foamed material;

c) cutting in said generally perpendicular direction of step (a) the polymeric foamed material with the plurality of cutters to produce a plurality of polymeric foamed material structures having a plurality of first slots, with each polymeric foamed material structure having one of the first slots.

221. The method of claim 220 additional comprising cutting, prior to said cutting step (c) and after said cutting step (b), the polymeric foamed material with the plurality of cutters until each cutter forms a second respective slot in the polymeric foamed material, said second respective slot terminating in opposed ends of the polymeric foamed material; and said cutting step (c) subsequently producing a plurality of polymeric foamed material structures having a plurality of first slots and a plurality of second slots, with each polymeric foamed material structure having one of the first slots and one of the second slots.

222. The method of Claim 220 additionally comprising computer operating said plurality of cutters, and said plurality of cutters are selected from the group consisting of hot wire cutters and laser cutters.

223. The method of Claim 221 additionally comprising computer operating said plurality of cutters, and said plurality of cutters are selected from the group consisting of hot wire cutters and laser cutters.

224. The method of Claim 223 wherein said polymeric foamed material is generally stationary and said plurality of cutters generally move simultaneously.

225. The method of Claim 224 additionally comprising providing a plurality of stud members wherein each of said stud members comprises a web and a flange integrally bound to said web; and disposing the plurality of stud members in said first slots and in said second slots of said polymeric foamed material structures to produce a plurality of polymeric foamed material panels, with each of the polymeric foamed material panels having the web and the flange of one of the stud members respectively occupying the first slot and the second slot associated with said each of the polymeric foamed material panels.

226. A method for producing a plurality of polymeric foamed material structures having brace-receiving slots comprising the steps of:

a) providing a generally stationary block of polymeric foamed material having a side surface and a pair of opposed ends;

b) moving generally simultaneously from said side surface a plurality of cutters through the block of polymeric foamed material in a generally perpendicular direction of travel, while interrupting at least one time the moving of the plurality of cutters in said generally perpendicular direction of travel to move the cutters through the block of polymeric foamed material in at least one direction of travel comprising a direction which differs from said generally perpendicular direction of travel, such that each cutter produces a respective brace-receiving slot in the polymeric foamed material terminating in said opposed end, until said plurality of cutters have moved completely through the generally stationary block of polymeric foamed material to produce a plurality of polymeric foamed material structures having a plurality of brace-receiving

slots, with each polymeric foamed material structure having at least one of the brace-receiving slots.

227. The method of Claim 226 additionally comprising computer operating said plurality of cutters.

228. The method of Claim 227 wherein said plurality of cutters are selected from the group consisting of hot wire cutters and laser cutters.

229. The method of Claim 226 additionally comprising providing a plurality of brace members; and disposing the plurality of brace members in the plurality of brace-receiving slots of said polymeric foamed material structures to produce a plurality of polymeric foamed material panels, with each polymeric foamed material panel having at least one of the brace members.

230. The method of Claim 228 additionally comprising providing a plurality of brace members; and disposing the plurality of brace members in the plurality of brace-receiving slots of said polymeric foamed material structures to produce a plurality of polymeric foamed material panels, with each polymeric foamed material panel having at least one of the brace members.

231. The method of Claim 226 wherein said at least one direction of travel comprises a first direction of travel, a second direction of travel immediately following said first direction of travel and being generally parallel to said generally perpendicular direction of travel, and a third direction of travel immediately following said second direction of travel.

232. The method of Claim 231 wherein said first direction of travel is generally normal to said generally perpendicular direction of travel, and said second direction of travel is generally normal to said first direction of travel.

233. The method of Claim 228 wherein said at least one direction of travel comprises a first direction of travel, a second direction of travel immediately following said first direction of travel and being generally parallel to said generally perpendicular direction of travel, and a third direction of travel immediately following said second direction of travel.

234. The method of Claim 233 wherein said first direction of travel is generally normal to said generally perpendicular direction of travel, and said second direction of travel is generally normal to said first direction of travel.

235. A plurality of polymeric foamed material structures produced in accordance with the method of Claim 199.

236. The plurality of polymeric foamed material structures produced in accordance with the method of Claim 215.

237. A plurality of polymeric foamed material panels produced in accordance with the method of Claim 216.

238. A plurality of polymeric foamed material panels produced in accordance with the method of Claim 217.

239. A plurality of polymeric foamed material structures produced in accordance with the method of Claim 220.

240. A plurality of polymeric foamed material panels produced in accordance with the method of Claim 225.

241. A plurality of polymeric foamed material structures produced in accordance with the method of Claim 226.

242. A plurality of polymeric foamed material panels produced in accordance with the method of Claim 229.

243. A plurality of polymeric foamed material structures produced in accordance with the method of Claim 231.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 415-576-0200.

Respectfully submitted,

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Attorney Docket No. 018696-1-1

PATENT APPLICATION

AN IMPROVED SYNTHETIC PANEL AND METHOD

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Entity: Small Entity

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PATENT

Attorney Docket No. 018696-1-1

AN IMPROVED SYNTHETIC PANEL AND METHOD

This is a continuation-in-part patent application of copending patent application having Serial No. 08/556,265, filed on November 13, 1995, and entitled "A SYNTHETIC PANEL AND METHOD."

Background Of The Invention

1. Field of the Invention

This invention relates to a synthetic panel. More specifically, this invention provides a polymeric foamed panel (e.g. a low density synthetic panel) and method for producing the polymeric foamed panel. This invention further provides a method for forming a structure with two or more polymeric foamed panels.

2. Description of the Prior Art

A patentability investigation was conducted and the following U.S. Patents were discovered:

U.S. Patent No. 4,163,349 to Smith; U.S. Patent No. 4,284,447 to Dickens et al.; U.S. Patent No. 4,602,466 to Larson; U.S. Patent No. 4,774,794 to Grieb; U.S. Patent No. 4,813,193 to Altizer; U.S. Patent No. 4,856,244 to Clapp; U.S. Patent No. 4,862,660 to Raymond; U.S. Patent No. 4,981,003 to McCarthy; U.S. Patent No. 5,021,108 to Bergqvist; U.S. Patent No. 5,245,809 to Harrington; U.S. Patent No. 5,265,389 to Mazzone et al.; U.S. Patent No. 5,269,109 to Gulur; and U.S. Patent No. 5,279,089 to Gulur.

U.S. Patent No. 4,163,349 to Smith teaches an insulated building panel having a core and overlapping skins which include an interior skin and an exterior skin. The interior skin at the panel's bottom covers a panel foot plate and the exterior skin at the panel's bottom also covers the panel foot plate and extends beyond to form an erection stop. End panels have relieved core areas for receiving bearing members

associated with a wall splice bearing post, and double parallel spaced header beams have an offset splice area within a several panel wall section.

U.S. Patent No. 4,284,447 to Dickens et al. teaches a method of forming a panel structure useful in building construction and the like including the steps of heating a heat expandable plastic in a separable mold having a cavity with the configuration of the resultant panel to form a panel core and adhering thin reinforcing strips to the front and back surfaces of the core. Control over the dimensions and configuration of the panel to Dickens et al. is obtained by adhering the strips to the core in the mold while applying heat thereto whereby core shrinkage is minimized.

U.S. Patent No. 4,602,466 to Larson teaches a method and apparatus for making building panels, including a means for positioning upper and lower rigid sheets of material, such as paper pulp, in spaced relation so that foamable material disposed between the sheets can move into gripping engagement with both sheets as it expands and solidifies.

U.S. Patent No. 4,774,794 to Grieb teaches a foam-cement building having the walls, roof and/or floor formed from a plurality of self supporting foam building blocks of varying density with a strong thin continuous structural and architectural coating on the surface of the blocks. The coating is formed from cement, reinforced with a fiberglass mesh and fiberglass roving strands. The blocks are interconnected by a mechanical key system or splines to form a monolithic structure.

U.S. Patent No. 4,813,193 to Altizer teaches an improved modular building comprising sidewall modules and ceiling modules. The sidewall modules comprise a primary frame to which a secondary frame of furring strips is attached. The sidewall modules further comprise foam insulation molded around the primary and secondary frame to define exterior and interior planar surfaces. The ceiling modules include frame means supporting a plurality of ceiling joists, and foam insulation dispersed within the frame means and between the

ceiling joist so as to define upper and lower ceiling surfaces.

U.S. Patent No. 4,856,244 to Clapp teaches tilt-wall concrete panels adapted for constructing small buildings with "finished" interiors, especially single-family residences, etc. A peripheral frame of wooden members is laid on top of a barrier film of plastic (e.g. 4 mil polyethylene) on a horizontal surface. Wood-like studs are then placed within the frame and nailed thereto. Any desired utility cables and service pipes are positioned within the frame. Clapp further teaches that an insulating foam cover, preferably high-density polyurethane, is then generated within and over the frame, to a depth that at least covers the wood-like studs and any utility or service lines. Foam having a thickness of about 1.5 inches covers these elements and bonds them securely together as a stable, easily movable "plate" after the foam plastic has hardened. A plurality of such plates, each sized to form a part of a building's wall, are positioned at a construction site where a foundation has been prepared. Clapp discloses that a concrete form is then temporarily completed around each plate, and concrete is poured on top thereof, to an average depth of about 4 to 6 inches. After the concrete hardens, the temporary form is removed and the composite panel is tilted to a vertical position. A plurality of such panels by Clapp are positioned edge-to-edge and joined to form a continuous outer wall for the building. The plastic barrier film is removed from the face of each panel, and interior wallboards or the like may be nailed to the exposed wood-like studs.

U.S. Patent No. 4,862,660 to Raymond teaches an integral energy efficient load-bearing exterior wall fabricated of lightweight foam surrounding plastic load-bearing columns. Raymond discloses prefabricated modular wall panels as individual building elements and as part of an integrated building system. The prefabricated modular wall panels are made from a foamed material that is molded around a plurality of vertically disposed hollow support columns. Each of the columns in U.S. Patent No. 4,862,660 to Raymond is taught as

containing a pair of opposed and vertically disposed T-shaped fastening supports which are arranged to form part of the interior and exterior surfaces of the foamed wall. The hollow columns are set onto locking base plates which are mounted on a wood or concrete deck system. Locking top plates are also mounted on wood and are then placed on top of the columns. The tubular columns are made of a plastic material and are shaped in cross-section in the form of a rectangle, square, diamond, oval or circle.

U.S. Patent No. 4,981,003 to McCarthy teaches a wall panel constructed from expanded polystyrene beads in an expanded polystyrene mold with structural members embedded in it during the molding process. The structural members are in the form of two by four studs placed at sixteen inch centers. Adjacent panels have interlocking grooves and ridges which fit together. McCarthy teaches that an advantage of his invention is that a total insulated wall is created with no cracks or spaces in the insulation.

U.S. Patent No. 5,021,108 to Bergqvist teaches an apparatus for manufacture of laminated panels having a foamed plastic core material including an inclined press having a fixed platen surface and a movable platen surface hinged adjacent to its lower edge. Panel thickness is adjustable by a mechanism which moves the hinge pivot relative to fixed platen surfaces. The platen surfaces in U.S. Patent No. 5,021,108 to Bergqvist are clamped at their upper edges by spaced clamps operable by lever and crank assemblies. A retractable seal spacer has liquid plastic injection nozzles and gas venting tubes in fluid communication with a hollow cavity in the press.

U.S. Patent No. 5,245,809 to Harrington teaches a panel for providing walls, roofs and floors with thermal insulation and fire retardance. The panel is taught to comprise at least two essentially parallel face members separated to form a space between the face members and urethane within the space to provide the thermal insulation and fire retardance. The panel may additionally include frame members extending between the face members for providing support and for enclosing the

urethane. At least one of the frame members has at least one port through which urethane foam can enter between the face members. U.S. Patent No. 5,245,809 to Harrington further teaches a method for creating a panel for providing insulated and fire retardant walls, floors and roofs. The method is taught by Harrington to include the steps of joining frame members together to form a panel frame of the desired dimensions, attaching face members to either side of the panel frame so that at least one enclosed space is formed within the face members and frame members, creating at least one port leading into the at least one enclosed space, and injecting urethane foam through the at least one port into the at least one enclosed space.

U.S. Patent No. 5,265,389 to Mazzone et al. teaches a composite building panel including a core of a foamed polymeric insulating material, such as expanded polystyrene, having a plurality of uniformly spaced open box tubes retained in vertical grooves formed in the rear surface of the core by a two-part epoxy adhesive. The tubes are mechanically connected at their ends to one leg of continuous horizontal channels having their other leg adhesively secured to the core at horizontal slots. The front surface of the core is continuous without seams and may be coated with a variety of exterior insulation finishing system coatings.

U.S. Patent Nos. 5,269,109 and 5,279,089 to Gulur teach an insulated load bearing wall comprising panels of extruded polymer foam into which tubular, load carrying frame members have been incorporated. A tongue is formed at one vertical edge of each panel and a groove is formed at the opposite vertical edge. The tubular frame members are bonded to the extruded polymer foam.

None of the foregoing U.S. Patents teach the particular methods of the present inventions for producing panels having a core of a foamed polymeric material, such as expanded polystyrene. StressSkin and Structural Panels have been in use for several decades. Alden Dow constructed his first StressSkin panel house in the late forties. Both technologies have relied on an inner and outer skin of wood either being

plywood or more recently OSB (oriented strand board). The plywood or OSB skin is attached to the foam core with an adhesive and then pressed together. The laminated panels are thereafter processed into engineered parts. The plywood or OSB skin does not provide for both a structure and a substrate for the interior and exterior finishes. Thus, what is needed and what has been invented by us is a foamed wall system and method that provides for a foamed polymeric material that becomes both a structure and a substrate for the interior and exterior finishes.

Summary Of The Invention

The present invention accomplishes its desired objects by providing a method for producing a polymeric foamed material panel (e.g. a low density synthetic panel) comprising the steps of:

(a) providing a polymeric foamed material;

(b) cutting the polymeric foamed material of step (a) until reaching a preconfiguration cut point;

(c) cutting subsequently from the preconfiguration cut point a brace-receiving configuration in the polymeric foamed material; and

(d) sliding a brace member into the brace-receiving configuration to produce a polymeric foamed material panel.

The cutting in step (b) and the cutting in step (c) comprises cutting the polymeric foamed material of step (a) with a hot wire cutter which is preferably operated by a computer. The brace-receiving configuration in the polymeric foamed material comprises a slot for receiving the brace member. The slot includes a seared wall for facilitating the sliding of the brace member. The brace member includes an opening with an opening perimeter. The method additionally comprises forming a polymeric foamed material opening in the polymeric foamed material. The polymeric foamed material opening has a polymeric foamed material opening perimeter. The sliding in step (d) comprises sliding the brace member into the brace-receiving configuration until the opening of the brace member is generally aligned with the polymeric foamed material opening. The opening perimeter of the opening in the brace member has a dimension that is greater than a dimension of the polymeric foamed material opening perimeter of the polymeric foamed material opening in the polymeric foamed material.

The method preferably additionally comprises passing a conduit through the polymeric foamed material opening of the polymeric foamed material and through the opening of the brace member; preferably such that the conduit is essentially supported by the polymeric foamed material and essentially

does not contact any of the opening perimeter of the opening in the brace member. The cutting in step (b) further comprises cutting a generally straight thread-like slot from a defined surface of the polymeric foamed material to the preconfiguration cut point. The brace-receiving configuration is essentially a generally C-shaped slot. The method further preferably includes that the cutting in step (b) and the cutting in step (c) is with a hot wire cutter wherein the hot wire cutter is at a temperature (e.g. 230°F to 580°F) such as to sear at least one wall of the C-shaped slot to smooth and harden the wall of the C-shaped slot for facilitating the sliding in step (d) of the brace member. The polymeric foamed material may be any suitable material (i.e. either low density and/or high density including engineered resins) that is capable of producing the panel or structure of the present invention, such as expanded polystyrene (EPS).

The present invention further accomplishes its desired objects by providing a method for forming a structure comprising the steps of:

(a) providing a first polymeric foamed material having a first defined edge;

(b) cutting the first polymeric foamed material until receiving a first preconfiguration cut point and cutting subsequently from the first preconfiguration cut points a first brace-receiving-configured slot in the first polymeric foamed material;

(c) cutting the first defined edge of the first polymeric foamed material to form a tongue on the first defined edge;

(d) sliding a first brace member into the first brace-receiving-configured slot;

(e) providing a second polymeric foamed material having a second defined edge;

(f) cutting the second polymeric foamed material until reaching a second preconfiguration cut point and cutting subsequently from the second preconfiguration cut point a second brace-receiving-

configured slot in the second polymeric foamed material;

(g) cutting the second defined edge of the second polymeric foamed material to form a channel in the second defined edge;

(h) sliding a second brace member into the second brace-receiving-configured slot; and

(i) sliding the tongue on the first defined edge of the first polymeric foamed material into the channel in the second defined edge of the second polymeric foamed material to form a structure.

The cutting in steps (b), (c), (f) and (g) comprises cutting with a hot wire cutter; preferably a computer operated hot wire cutter. The first brace-receiving-configured slot in the first polymeric foamed material and the second brace-receiving-configured slot in the second polymeric foamed material respectively comprise a first slot with a first wall for receiving the first brace member and a second slot with a second wall for receiving the second brace member. The first wall of the first slot includes a first seared wall for facilitating the sliding of the first brace member and the second wall of the second slot includes a second seared wall for facilitating the sliding of the second brace member. The first brace member includes a first opening with a first opening perimeter and the second brace member includes a second opening with a second opening perimeter.

The method additionally includes forming a first polymeric foamed material opening in the first polymeric foamed material and forming a second polymeric foamed material opening in the second polymeric foamed material. The first polymeric foamed material opening includes a first polymeric foamed material opening perimeter and the second polymeric foamed material opening includes a second polymeric foamed material opening perimeter. The sliding step (d) comprises sliding the first brace member into the first brace-receiving-configured slot until the first opening of the first brace member is generally aligned with the first polymeric foamed materials opening; and the sliding step (h)

comprises sliding the second brace member into the second brace-receiving-configured slot until the second opening of the second brace member is generally aligned with the second polymeric foamed material opening. The first and second openings of the first and second brace members and the first and second polymeric foamed material openings of the first and second polymeric foamed materials are all aligned for receiving a conduit. The first opening perimeter of the first opening in the first brace member has a first dimension that is greater than a first dimension of the first polymeric foamed material opening perimeter of the first polymeric foamed material opening in the first polymeric foamed material; and the second opening perimeter of the second opening in the second-brace member has a second dimension that is greater than a second dimension of the second polymeric foamed material opening perimeter of the second polymeric foamed material opening in the second polymeric foamed material.

The method preferably additionally comprises passing a conduit through the first polymeric foamed material opening in the first polymeric foamed material and through the first opening of the first brace member and further passing the conduit through the second polymeric foamed material opening in the second polymeric material and through the second opening of the second brace member; preferably such that the conduit is essentially supported by the first polymeric foamed material and by the second polymeric material and essentially does not contact any of the first opening perimeter of the first opening in the first brace member and any of the second opening perimeter of the second opening in the second brace member.

The method also preferably additionally comprises cutting, prior to the cutting in step (b), a first generally straight thread-like slot in the first polymeric foamed material up to a first preconfiguration cut point wherein the step (b) cutting commences; and further also preferably additionally comprises cutting, prior to the cutting in step (f), a second generally straight thread-like slot in the

second polymeric foamed material up to a second preconfiguration cut point wherein the step (f) cutting commences. The first brace-receiving-configured slot is essentially a first generally C-shaped slot and the second brace-receiving-configured slot is essentially a second generally C-shaped slot. The cutting in step (b), step (c), step (f), and step (g) comprises cutting with a hot wire cutter which is at a temperature (e.g. 230°F to 580°F) such as to sear at least one wall of the first C-shaped slot and to sear at least one wall of the second C-shaped slot to smooth and harden the wall of the first C-shaped slot and to smooth and harden the wall of the second C-shaped slot for facilitating the sliding in step (d) of the first brace member and for facilitating the sliding in step (h) of the second brace member. The first polymeric foamed material and the second polymeric foamed material both may consist of any suitable material (e.g. any suitable polymeric foamed material) such as that comprising expanded polystyrene (EPS).

The present invention therefore provides a method for producing a polymeric foamed material panel comprising the steps of:

(a) providing a polymeric foamed material in a generally stationary position;

(b) cutting the generally stationary polymeric foamed material of step (a) until reaching a preconfiguration cut point;

(c) cutting subsequently from the preconfiguration cut point a brace-receiving configuration in the generally stationary polymeric foamed material; and

(d) sliding a brace member into the brace-receiving configuration to produce a polymeric foamed material panel.

The present invention further therefore provides a method for producing a polymeric foamed material panel comprising the steps of:

(a) providing a polymeric foamed material;

(b) providing a brace member with brace sides;

(c) cutting a brace-receiving configuration in the polymeric foamed material; and

(d) sliding the brace member of step (b) into the brace-receiving configuration such that the brace sides are essentially surrounded by the polymeric foamed material to produce a polymeric foamed material panel.

The present invention also further therefore provides a method for producing a polymeric foamed material panel comprising the steps of:

(a) providing a polymeric foamed material with a planar side surface;

(b) cutting with a cutter from the planar side surface a path in the polymeric foamed material of step (a);

(c) retracing the path of step (b) with the cutter to produce a brace-receiving configuration in the polymeric foamed material; and

(d) sliding a brace member into the brace-receiving configuration to produce a polymeric foamed material panel.

The present invention yet also further therefore provides a method for producing a polymeric foamed material panel comprising the steps of:

(a) providing a polymeric foamed material with a planar side surface;

(b) contacting the planar side surface with a cutter;

(c) cutting with the cutter the polymeric foamed material from the planar side surface thereof until reaching a preconfiguration cut point within the polymeric foamed material;

(d) cutting with the cutter from the preconfiguration cut point of step (c) a slot in the polymeric foamed material of step (c);

(e) cleaning the slot of step (d) with the cutter to produce a brace-receiving configuration in the polymeric foamed material; and

(f) sliding a brace member into the brace-receiving configuration to produce a polymeric foamed material panel.

In addition to the foregoing methods, the present invention provides at least one polymeric foamed material panel. The polymeric foamed material panel of the present invention comprises a panel consisting of a polymeric foamed material. A brace-receiving-configured slot is disposed in the polymeric foamed material of the panel and a brace member is disposed in the brace-receiving-configured slot in the polymeric foamed material of the panel. The brace-receiving-configured slot preferably includes at least one seared wall; and the polymeric foamed material panel additionally comprises a generally straight thread-like slot extending from a defined surface of the polymeric foamed material to the brace-receiving-configured slot; and a second generally straight thread-like slot extending from the defined surface of the polymeric foamed material to a generally cylindrical opening in the polymeric foamed material. The brace member has a brace opening which is generally aligned with the cylindrical opening in polymeric foamed material.

In another embodiment of the present invention there is provided a method for forming a structure comprising the steps of:

(a) providing a first polymeric foamed material having a first defined edge;

(b) cutting (e.g. with a hot wire cutter or a laser cutter) a first slot in the first polymeric foamed material;

(c) providing a first internal reinforcing member having a male member;

(d) sliding the first internal reinforcing member of step (c) into the first slot of step (b) such that the male member protrudes from the first defined edge;

(e) providing a second polymeric foamed material having a second defined edge;

(f) cutting (e.g. with a hot wire cutter or a laser cutter) a second slot in the second polymeric foamed material;

(g) providing a second internal reinforcing member having a female member;

(h) sliding the second internal reinforcing member of step (g) into the second slot of step (f) such that the female member is exposed along the second defined edge; and

(i) sliding the male member, which projects from the first defined edge of the first polymeric foamed material, into the female member, which is exposed along the second defined edge of the second polymeric foamed material, to form a structure.

In yet another embodiment of the present invention, there is provided a method for producing a plurality of polymeric foamed material structures having brace-receiving configurations comprising the steps of:

(a) providing a block, preferably a generally stationary block, of polymeric foamed material, such as expanded polystyrene (EPS);

(b) cutting the polymeric foamed material of step (a) with a plurality of cutters (e.g., hot wire cutters, laser cutters, etc.) until each cutter reaches a respective preconfiguration cut point;

(c) cutting subsequently with each cutter from the respective preconfiguration cut point of each cutter a respective brace-receiving configuration in the polymeric foamed material; and

(d) cutting, after the cutting step (c), the polymeric foamed material of step (c) with the plurality of cutters to produce a plurality of polymeric foamed material structures, each of the polymeric foamed material structures having a brace-receiving configuration, which may be linear or nonlinear.

The immediate foregoing method additionally comprises cutting with each cutter, prior to the cutting step (d), a respective polymeric foamed material opening in the polymeric

foamed material such that each polymeric foamed material structure has a polymeric foamed material opening to define a chase. The cutters are preferably computer operated to provide desired cut accuracy.

In yet another embodiment of the present invention, there is also provided a method for producing a plurality of polymeric foamed material panels comprising the steps of:

(a) providing a block (e.g., a generally stationary block) of polymeric foamed material (e.g., expanded polystyrene (EPS));

(b) cutting the polymeric foamed material of step (a) with a plurality of cutters (e.g., hot wire cutters, laser cutter, etc.) until each cutter reaches a respective preconfiguration cut point;

(c) cutting subsequently with each cutter from the respective preconfiguration cut point of each cutter a respective brace-receiving slot in the polymeric foamed material;

(d) cutting, after the cutting step (c), the polymeric foamed material of step (c) with said plurality of cutters to produce a plurality of polymeric foamed material structures having a plurality of brace-receiving slots, which may be linear or nonlinear slots; and

(e) sliding a plurality of brace members into the brace-receiving slots of the polymeric foamed material structures of step (d) to produce a plurality of polymeric foamed material panels, each of the polymeric foamed material panels having at least one of the brace members.

In the immediate foregoing method of the present invention, the brace members include sides. More particularly, each of the brace members preferably comprises a web, a first flange integrally bound to the web, a first flange return integrally bound to the first flange, a second flange also integrally bound to the web, and a second flange return integrally bound to the second flange. The web, the first and second flanges, and the first and second flange returns are surrounded by the polymeric foamed materials.

Alternatively and as another embodiment of the present invention, a portion of at least one brace member protrudes from each of the polymeric foamed material panels. Therefore, the sliding step (e) in the immediate foregoing method more specifically comprises sliding the first flange and the first flange return and a portion of the web of respective brace members into respective brace-receiving slots of the polymeric foamed material structures to produce the plurality of polymeric foamed material panels, with each of the polymeric foamed material panels having the second flange and the second flange return and a portion of the web of at least one of the brace members disposed outside thereof.

An alternative embodiment of the present invention further also provides a method for producing a plurality of polymeric foamed material structures having slots for receiving stud members comprising the steps of:

(a) cutting a polymeric foamed material (e.g., a generally stationary block of expanded polystyrene (EPS)) with a plurality of cutters, such as hot wire cutters or laser cutters, in a first direction;

(b) cutting subsequently in a second direction the polymeric foamed material of step (a) with the plurality of cutters until each cutter forms a first respective slot in the polymeric foamed material;

(c) cutting, after the cutting step (b), in the first direction the polymeric foamed material of step (b) with the plurality of cutters to produce a plurality of polymeric foamed material structures having a plurality of first slots, which may be linear or nonlinear slots.

The immediately foregoing method broadly additionally comprises cutting, prior to the cutting step (c), the polymeric foamed material of step (b) with the plurality of cutters until each cutter forms a second respective slot in the polymeric foamed material. The immediate foregoing method more particularly additionally comprises cutting, prior to the cutting step (c), the polymeric foamed material of step (b) with the plurality of cutters until each cutter forms a

respective recess in the polymeric foamed material; and subsequently cutting, prior to the cutting step (c), the polymeric foamed material with the plurality of cutters until each cutter forms a second respective slot in the polymeric foamed material such that after the cutting step (c), a plurality of polymeric foamed material structures are produced having a plurality of first slots and a plurality of second slots and a plurality of recesses. A plurality of stud members is provided wherein each of the stud members comprises a web, a first flange integrally bound to the web, a first flange return integrally bound to the first flange, a second flange also integrally bound to the web, and a second flange return integrally bound to the second flange. The stud members are slid into the first and second slots and into the recesses of the polymeric foamed material structures, such that after the sliding step, the first flange return and the first flange of each of the stud members occupies respectively one of the first slots and one of the recesses of the polymeric foamed material structures, and the web, the second flange and the second flange return of each of the stud members occupies one of the second slots of the polymeric foamed material structures. The cutters are preferably computer operated to provide the desired cut accuracy during the cutting steps.

The alternative embodiment of the present invention more specifically includes a method for producing a plurality of polymeric foamed material structures having slots for receiving stud members comprising the steps of:

(a) cutting a polymeric foamed material with a plurality of cutters in a first direction until each of the cutters has moved a respective first distance in the polymeric foamed material;

(b) cutting subsequently with the plurality of cutters in a second direction the polymeric foamed material of step (a) until each of the cutters has moved a respective second distance in the polymeric foamed material of step (a);

(c) cutting subsequently with the plurality of cutters in the first direction the polymeric foamed material of step (b) until each of the cutters has moved a respective third distance in the polymeric foamed material of step (b);

(d) cutting subsequently with the plurality of cutters in a third direction the polymeric foamed material of step (c) until each of the cutters has moved a respective fourth distance in the polymeric foamed material of step (c);

(e) cutting subsequently with the plurality of cutters in the first direction the polymeric foamed material of step (d) until each of the cutters has moved a respective fifth distance in the polymeric foamed material of step (d);

(f) cutting subsequently with the plurality of cutters in the second direction the polymeric foamed material of step (e) until each of the cutters has moved a respective sixth distance in the polymeric foamed material of step (e);

(g) cutting subsequently with the plurality of cutters in a fourth direction the polymeric foamed material of step (f) until each of the cutters has moved a respective seventh distance in the polymeric foamed material of step (f);

(h) cutting subsequently with the plurality of cutters in the third direction the polymeric foamed material of step (g) until each of the cutters has moved a respective eighth distance in the polymeric foamed material of step (g);

(i) cutting subsequently with the plurality of cutters in the fourth direction the polymeric foamed material of step (h) until each of the cutters has moved a respective ninth distance in the polymeric foamed material of step (h);

(j) cutting subsequently with the plurality of cutters in the second direction the polymeric foamed material of step (i) until each of the cutters has moved

a respective tenth distance in the polymeric foamed material of step (i);

(k) cutting subsequently with the plurality of cutters in the first direction the polymeric foamed material of step (j) until each of the cutters has moved a respective eleventh distance in the polymeric foamed material of step (j);

(l) cutting subsequently with the plurality of cutters in the third direction the polymeric foamed material of step (k) until each of the cutters has moved a respective twelfth distance in the polymeric foamed material of step (k); and

(m) cutting, after the cutting step (l), in the first direction the polymeric foamed material of step (l) with the plurality of cutters to produce a plurality of polymeric foamed material structures having a plurality of slots.

In the immediate foregoing method, the respective third distance and the respective eighth distance are approximately equal. Similarly, the respective fifth distance and the respective seventh distance are approximately equal. The respective fourth distance is generally less than the respective second distance, and the respective eighth distance is generally less than the respective tenth distance. The third direction is generally opposite to the second direction, and the fourth direction is generally opposite to the first direction. The cutters are preferably computer operated hot wire cutters which generally move in unison. Each of the hot wire cutters includes a wire diameter with a generally known diameter measurement which generally equals the respective third distance and the respective eighth distance.

One of the alternative embodiments of the present invention also more specifically includes a method for producing a plurality of polymeric foamed material structures comprising the steps of:

(a) cutting a polymeric foamed material (e.g., a generally stationary block of expanded polystyrene (EPS)) with a plurality of cutters (e.g., computer-

operated hot wire cutters or laser cutters) until each cutter reaches a respective first cut point;

(b) cutting subsequently with each cutter from the respective first cut point a respective path in the polymeric foamed material of step (a) until each cutter reaches a respective second cut point;

(c) moving each of the plurality of cutters from the respective second cut point to a respective off-set position in the polymeric foamed material of step (b);

(d) retracing generally with each cutter the respective path of each cutter, while each cutter remains in the respective off-set position of step (c) such that a respective slot is formed by each cutter in the polymeric foamed material of step (c); and

(e) cutting the polymeric foamed material of step (d) with the plurality of cutters until the cutters have cut through the polymeric foamed material of step (d), producing a plurality of polymeric foamed material structures having slots, which may be either linear or non-linear slots. The method additionally comprises cutting with the plurality of cutters track chases in the polymeric foamed material structures of step (e) such that each of the plurality of polymeric foamed material structures additionally includes a track chase.

Other features of the alternative embodiments of the present invention include interrupting the movement of a plurality of cutters in a first direction of travel to move the cutters in at least one direction of travel which differs from the first direction of travel in order to form one or more brace-receiving slots. These features are embodied in a method for producing a plurality of polymeric foamed material structures having brace-receiving slots comprising the steps of: (a) providing a block of polymeric foamed material; and (b) moving a plurality of cutters through the block of polymeric foamed material in a first direction of travel, while interrupting at least one time the moving of the plurality of cutters in the first direction of travel to move

the cutters through the block of polymeric foamed material in at least one direction of travel which differs from the first direction of travel, such that each cutter produces a respective brace-receiving slot in the polymeric foamed material, until the plurality of cutters have moved completely through the block of polymeric foamed material to produce a plurality of polymeric foamed material structures with each structure having at least one brace-receiving slot. These features are also embodied in a method for producing a plurality of polymeric foamed material structures having brace-receiving slots comprising the steps of: (a) providing a block of polymeric foamed material in a generally stationary position; (b) moving a plurality of cutters through the generally stationary block of polymeric foamed material of step (a) in a first direction of travel; (c) interrupting the movement of the plurality of cutters from the first direction of travel through the generally stationary block of polymeric foamed material to move the cutters in at least one direction of travel which differs from the first direction of travel such that each cutter produces a respective brace-receiving slot in the polymeric foamed material, and (d) continuing the moving step (b) of the plurality of cutters in the first direction of travel, while intermittently interrupting the movement of the plurality of cutters from the first direction of travel to move the cutters in at least one direction of travel which differs from the first direction of travel such that each cutter produces at least one additional respective brace-receiving slot in the polymeric foamed material, until the plurality of cutters have moved completely through the generally stationary block of polymeric foamed material after which a plurality of polymeric foamed material structures are produced with each polymeric foamed material structure having a plurality of brace-receiving slots.

An alternative embodiment of the present invention therefore accomplishes its desired objects by broadly providing a method for producing a plurality of polymeric foamed material panels comprising the steps of:

(a) cutting a polymeric foamed material in a first direction with a plurality of cutters generally moving in unison;

(b) cutting subsequently the polymeric foamed material of step (a) in a second direction with the plurality of cutters generally moving in unison;

(c) cutting, after the cutting step (b), the polymeric foamed material of step (b) in the first direction with the plurality of cutters generally moving in unison;

(d) cutting, after the cutting step (c), the polymeric foamed material of step (c) in a third direction with the plurality of cutters generally moving in unison wherein the third direction is generally opposite to the second direction;

(e) cutting, after the cutting step (d), the polymeric foamed material of step (d) in the first direction with the plurality of cutters generally moving in unison until the cutters have cut through the polymeric foamed material of step (d) to produce a plurality of polymeric foamed material structures having brace-receiving configurations; and

(f) sliding brace members into the brace-receiving configurations of the polymeric foamed material structures of step (e) to produce a plurality of polymeric foamed material panels with each polymeric foamed material panel having one of the brace members.

An alternative embodiment of the present invention also accomplishes its desired objects by broadly providing a method for producing a polymeric foamed material structure having a slot comprising the steps of:

(a) cutting with a cutter a polymeric foamed material until reaching a preslot cut point;

(b) cutting subsequently a first path in the polymeric foamed material with the cutter from the preslot cut point until reaching a first cut point;

(c) moving the cutter in the polymeric foamed material of step (b) a predetermined distance from the first cut point to a second cut point; and

(d) cutting subsequently from the second cut point a second path in the polymeric foamed material of step (c) with the cutter until the cutter reaches a postslot cut point to produce a polymeric foamed material structure having a slot.

In the immediate foregoing method of the present invention, the cutter is preferably a computer-operated hot wire cutter having a wire diameter with a generally known diameter measurement, and the slot of step (d) has a width equal to about twice the generally known diameter measurement of the wire diameter, and a width equal to about twice the predetermined distance of step (c). A stud member may be slid into the slot of step (d).

An alternative embodiment of the present invention further also accomplishes its desired objects by broadly providing a method for producing at least one polymeric foamed material structure having at least one slot comprising the steps of:

(a) providing at least one cutter;

(b) cutting with the cutter of step (a) a polymeric foamed material until the cutter reaches at least one respective preslot cut point;

(c) cutting subsequently with cutter from the respective preslot cut point of step (b) at least one respective path in the polymeric foamed material of step (b) until the cutter reaches at least one first cut point;

(d) forming with the cutter in the polymeric foamed material of step (c) at least one respective off-set path communicating with the respective path of step (c) to form at least one slot within the polymeric foamed material of step (c); and

(e) cutting subsequently the polymeric foamed material of step (d) with the cutter until the cutter has cut through the polymeric foamed material of step (d),

producing at least one polymeric foamed structure having at least one slot.

In the immediate foregoing method for an improved embodiment of the present invention, the at least one respective path has at least one respective path length, and the at least one respective off-set path communicates with the at least one respective path along the at least one respective path length of the at least one respective path, such that the at least one respective path and the least one respective off-set path together form the at least one slot within the polymeric foamed material of step (c). Preferably, the at least one cutter comprises a plurality of computer-operated hot wire cutters cutting a plurality of respective paths in the polymeric foamed material of step (b) and forming a plurality of respective off-set paths in the polymeric foamed material of step (c), such that the plurality of respective paths and the plurality of respective off-set paths together form a plurality of respective slots in the polymeric foamed material of step (c), and such that, after the cutting step (e) with the plurality of hot wire cutters, a plurality of polymeric foamed structures are produced having a plurality of slots. A plurality of stud members are slid into the plurality of slots.

It is therefore an object of the present invention to provide a method for producing a polymeric foamed material panel.

It is another object of the present invention to provide a method for forming a polymeric foamed material structure.

It is yet further an object of the present invention to provide a polymeric foamed material panel.

These, together with the various ancillary objects and features which will become apparent to those skilled in the art as the following description proceeds, are attained by these novel methods and polymeric foamed material panels, a preferred embodiment being shown with reference to the accompanying drawings, by way of example only, wherein:

Brief Description Of The Drawings

Fig. 1 is a perspective view of a polymeric foamed material panel produced in accordance with the method of the present invention;

Fig. 2 is a partial perspective view of a structure consisting of standard trusses and polymeric foamed material panels forming walls and roofs;

Fig. 2A is another partial perspective view of a structure similar to the partial perspective view in Fig. 2 wherein the structure includes standard trusses and polymeric foamed material panels forming walls and roofs;

Fig. 3 is a partial perspective view of a polymeric foamed material panel including a brace member having an opening with a conduit supported by the polymeric foamed material and passing through the opening of the brace member without contacting any of the circumference or perimeter of the opening of the brace member;

Fig. 4 is a partial perspective view of two panel members disposed contiguous to each other and encapsulated in sheetrock or the like;

Fig. 5 is a top plan view of the pair of contiguous panel members of Fig. 4 encapsulated in sheetrock or the like;

Fig. 6 is a top plan view of a panel member having a plurality of steel studs or brace members disposed therein with the inside wall thereof covered with sheetrock and further having a tongue member at one end and a channel member at another end;

Fig. 7 is a perspective view of the hot wire cutter mounted on a table and operated by a computer;

Fig. 8 is a schematic diagram of the various process steps in producing the panel member of the present invention;

Fig. 9 is a perspective view of a hot wire cutter having cut through the polymeric foam material to a point where a subsequent general C-shaped slot is to be cut by the hot wire cutter, the C-shaped slot to be cut being represented by dotted lines;

Fig. 10 is a perspective view of the polymeric foamed material after a pair of C-shaped slots have been cut with the

hot wire cutter and after the polymeric foam material has been rotated, with a hot wire cutter having cut a general cylindrical opening in the polymeric foam material transverse to the C-shaped slots, leaving a residual core material in the transverse opening; and further illustrating a metallic U-shaped stud in proximity to one of the C-shaped slots for being slid into the same;

Fig. 11 is an end elevational view of the residual core material being removed from the cylindrical opening in the polymeric foam material and with a conduit aligned with the cylindrical opening in order to be slid subsequently therein;

Fig. 12 is vertical sectional view of the polymeric foam material supporting a conduit while the conduit passes through an opening in the brace or stud member without touching any of the circumference or perimeter of the stud or brace member;

Fig. 13 is a partial perspective view of two polymeric foamed material panel members with ends of the two polymeric foamed material panel members being generally aligned such that the tongue on one end of one panel member may slid into a channel in one of the ends of the other panel member;

Fig. 14 is a partial vertical sectional view taken in direction of the arrows and along the plane of line 14-14 in Fig. 8 ;

Fig. 14A is a vertical sectional view taken in direction of the arrows and along the plane of line 14A-14A in Fig. 14;

Fig. 15 is a perspective view of a plurality of hot wire cutters cutting through a block of polymeric foamed material to produce a plurality of polymeric foamed structures having slots for receiving brace or stud members and having chases (or polymeric openings) wherethrough conduits pass;

Fig. 16 is a perspective view of a table assembly supporting a block of polymeric foamed material with a plurality of hot wire cutters passing and cutting through the polymeric foamed material block, and with the vertical and horizontal movement of the hot wire cutters being respectively controlled by a motor (M_V) for controlling the vertical movement of the plurality of hot wire cutters and by a motor (M_H) for controlling the horizontal movement of the plurality

of hot wire cutters, wherein power to the motors M_V and M_H is allocated or metered from a CNC controller which receives signals from a computer;

Fig. 17 is an enlarged partial perspective view of a horizontal trolley supporting a vertical support of a harp and slidably engaged to a horizontal trolley track supported by the table assembly, and of a vertical trolley slidably mounted to the vertical support of the harp with a hot wire cutter coupled to the vertical trolley, such that the horizontal trolley can move the hot wire cutter in a horizontal direction and the vertical trolley can move the hot wire cutter in a vertical direction;

Fig. 18 is a schematic block diagram of the computer control assembly for controlling the plurality of hot wire cutters illustrating a computer, a CNC controller electrically engaged to the computer for receiving signals therefrom, a power box communicating with a power source and electrically engaged to the CNC controller to supply power to the CNC controller, and a pair of motors (M_V and M_H) electrically engaged to the CNC controller for receiving metered or allocated power from the CNC controller to control the vertical and horizontal movement of the plurality of hot wire cutters;

Fig. 19 is an end elevational view of a plurality of polymeric foamed structures produced after a plurality of computer-controlled hot wire cutters have passed through a block of polymeric foamed material;

Fig. 20 is an end elevational view of a polymeric foamed structure having a slot formed therein with a hot wire cutter with arrows representing directions and paths that the hot wire cutter travelled in forming the slot;

Fig. 20A is an enlarged end elevational view of the polymeric foamed structure of Fig. 20 with a stud or brace member lodged in the slot;

Fig. 20B is an end elevational view of a pair of polymeric foamed material structures which were integrally bound to each other before being severed, with one polymeric foamed material structure having a polymeric material recess

and with the other polymeric foamed material structure having a polymeric material crest which may serve as a benchmark or indicator for a brace member when the brace member is lodged in a slot located immediately below the polymeric material crest;

Fig. 21 is an exploded detail view of a section of the slot of Fig. 20 with the hot wire cutter being shown in a dotted line representation and with the arrows showing the directions and paths of travel for the hot wire cutter;

Fig. 22 is an exploded detail view of another section of the slot of Fig. 20 with the hot wire cutter being shown again in a dotted line representation and with the arrows showing again the directions and paths of travel for the hot wire cutter;

Fig. 23 is an enlarged view of the detail view of Fig. 21 with "**W**" indicating the width of the slot and "**D**" indicating the diameter of the hot wire cutter;

Fig. 24 is an enlarged view of the detail view of Fig. 22;

Fig. 25 is an end elevational view of a polymeric foamed material structure produced from a block of polymeric foamed material and after a hot wire cutter has cut a plurality of slots (i.e., C-brace chases), a polymeric opening (i.e., a wiring chase), and a track chase in the polymeric foamed material structure;

Fig. 26 is another end elevational view of a polymeric foamed material structure produced from a block of polymeric foamed material and after a hot wire cutter has cut in the polymeric foamed material a plurality of slots or chases for receiving brace or stud members, a polymeric opening or wiring chase for receiving a conduct, and a track chase for receiving a track member;

Fig. 27 is an end elevational view of the polymeric foamed material structure of Fig. 26 after brace or stud members (i.e., C-shaped braces or studs) have been slid into the plurality of slots or chases such that a portion of the brace members protrude from the polymeric foamed material structure;

Fig. 28 is an end elevational view of the polymeric foamed material structure of Fig. 27 after a track member has been slid into the track chase and over the ends of the brace or stud members;

Fig. 28A is a vertical sectional view taken in direction of the arrows and along the plane of line 28A-28A in Fig. 28;

Fig. 28B is a vertical sectional view taken in direction of the arrows along the plane of line 28B-28B in Fig. 28;

Fig. 29 is an end elevational view of a polymeric foamed material structure produced from the block of polymeric foamed material and after a hot wire cutter has cut a plurality of slots or chases and a track chase in the polymeric foamed material structure;

Fig. 30 is an end elevational view of the polymeric foamed material structure of Fig. 29 after a plurality of Z-shaped studs or braces have been inserted into the slots or chases such that a portion of the Z-shaped studs or braces protrudes from the polymeric foamed material structure;

Fig. 31 is an end elevational view of the polymeric foamed material structure in Fig. 30 after a track member has been inserted into the track chase and over the ends of the Z-shaped studs or brace members;

Fig. 32 is an enlarged partial perspective view of an end of a polymeric foamed material structure after a hot wire cutter has cut a plurality of C-shaped slots in the polymeric foamed material structure and after a polymeric opening (i.e. a wiring chase) has also been cut in the polymeric foamed material structure by the hot wire cutter;

Fig. 33 is a partial perspective view of an end of a polymeric foamed material panel having a plurality of C-shaped studs or brace members inserted within slots in a polymeric foamed material structure with a portion of the studs or brace members protruding therefrom;

Fig. 34 is a partial perspective view of an end of a polymeric foamed material panel having a plurality of studs or brace members lodged in slots produced by a hot wire cutter with a portion of each of the studs or brace members protruding from the polymeric foamed material panel;

Fig. 35 is a vertical sectional view taken in direction of the arrows and along the plane of line 35-35 in Fig. 34, illustrating a track chase which was cut in the polymeric foamed material by a hot wire cutter;

Fig. 36 is a perspective view of a polymeric foamed material panel having a plurality of braces embedded therein with a vertical conduit having been slid into a vertical wiring chase, and with a horizontal conduit having been slid into a horizontal wiring chase, and including an internal reinforcing member lodged within a horizontal polymeric opening with a male end of the internal reinforcing member protruding from a side of the polymeric foamed material panel; and

Fig. 37 is a partial side elevational view of a pair of engaged polymeric foamed material panels having respective internal reinforcing members with the male end of one internal reinforcing member lodged in the female end of the other internal reinforcing member.

Description Of The Preferred Embodiment

Referring in detail now to the drawings wherein similar parts of the invention are identified by like reference numerals, there is seen a panel member, generally illustrated as **10**, produced in accordance with the method of the present invention. The panel member **10** comprises a polymeric foamed material, generally illustrated as **12**, and a plurality of stud or brace members **14** disposed in the polymeric foamed material **12**. Each of the brace members **14** pass into a slot, generally illustrated as **30** (see Figs. 4 and 8), which was preferably preformed or precut. As best shown in Figs. 6 and 29, slot **30** may be non-linear. Each of the brace members **14** may be any suitable brace member such as studs, load-bearing members, etc. constructed of any suitable material (e.g. metal, wood, etc.) Most preferably, the brace members **14** are metal (e.g. a light gauge metal) studs for load-bearing and adding strength to the polymeric foamed material **12**. As best shown in Figs. 1 and 6, each brace member **14** includes brace sides **14a, 14b, 14c,** and **14d** and **14e** which are all essentially surrounded by the polymeric foamed material **12**. Stated alternatively and as best shown in Figs. 33 and 34, each stud or brace member includes a web **14w**, a pair of flanges **14f-14f** integrally secured to the web **14w**, and a pair of flange returns **14r-14r,** respectively integrally bound to the respective flanges **14f-14f**.

In the embodiment of the invention shown in Figs. 30 and 31, each stud or brace member **14** is generally geometrically Z-shaped with the web **14w** being oblique with respect to flanges **14f-14f** as opposed to being normal thereto as shown in Figs. 31 and 35. In the embodiment of the invention shown in Figs. 27, 28, 30, 31, 33 and 34 a portion of each stud or brace member protrudes from the polymeric foamed material **12**. More specifically, one of the flanges **14f-14f** and its associated flange return **14r**, along with a portion of the web **14w,** are embedded in the polymeric foamed material **12**, while the remaining flange **14f** and its associated flange return **14r**, along with a remaining portion of the **14w**, are disposed outside of the polymeric foamed material **12**.

Referring now to Figs. 20 and 20A, there is seen a slot **30** communicating with a polymeric material recess **12r**. Slot **30** and polymeric material recess **12r** were cut in the polymeric foamed material in accordance with a cutting procedure set forth hereinafter. The slot **30** more specifically includes vertical slot section **30r**$_1$ and a generally inverted L-shaped slot section **30**$_s$ which includes individual slot sections **30w**, **30f** and **30r**$_2$. As best shown in Fig. 20, slot sections **30r**$_1$ and **30w** directly communicate with the polymeric material recess **12r**. A brace member **14** lodges in slot section **30r**$_1$, in polymeric material recess **12r**, and in slot section **30s**. More specifically and as best shown in Fig. 20A, one flange return **14r** and one flange **14f** of a brace member **14** respectively lodges in slot section **30r**$_1$ and polymeric material access **12r**, while the remaining web **14w**, flange **14f** and flange return **14r** of the brace **14** respectively lodges in slot section **30w**, slot section **30f** and slot section **30r**$_2$ of the slot section **30s**.

After a polymeric material recess **12r** has been cut in a polymeric foamed material **12**, the polymeric foamed material **12** adjacent or contiguous to the polymeric foamed material **12** having the polymeric material recess **12r** has a polymeric material crest or ridge **12c** as best shown in Fig. 20B. This polymeric material crest **12c** previously integrally resided within the polymeric material recess **12r**, and may be either removed, such as by sanding, or be used as a benchmark or indicator for a location of a brace member **14**. Referring more particularly to Fig. 20B wherein there is seen two severed polymeric foamed materials **12a** and **12b**, with polymeric foamed material **12a** having polymeric material recess **12r** and with polymeric foamed material **12b** having the polymeric material crest **12c**. When a brace member **14** is slid into the slot **30** of the polymeric foamed material **12b**, the brace member **14** in the polymeric foamed material **12b** would be immediately below (e.g. one (1) to three (3) inches below) the polymeric material crest **12c**. Thus, a person looking at the planar side of polymeric foamed material **12b** having the polymeric material crest **12c**, and not being able to see the planar side of the polymeric foamed material **12b** where the brace member **14** is

exposed, would still know that immediately below the polymeric material crest **12c** lies a brace member **14**. Thus, the polymeric material crest **12c** may serve as a benchmark or indicator for the location of a brace member **14**.

In the embodiment of the invention shown in Figs 25-31, 34 and 36, the polymeric foamed material **12** includes a track chase **100** (i.e., a cut slot ranging from about one-quarter (¼) inch to about 1½ inches in depth), as best shown in Fig. 35. A track member **102** is provided and includes a track base **104** with a pair of track flanges **105-106** integrally bound thereto. As best shown in Figs. 28A and 28B, one of the track flanges **106** may lodge in the track chase **100** with a portion of the track base **104** extending away from the polymeric foamed material **12** (see Fig. 28A), such that one of the track flanges **106** associated with the track base **104** is situated outside of the polymeric foamed material **12**. The track flange **106** disposed outside of the polymeric foamed material **12** may be secured to one of the flanges **14f** of the stud or brace member **14** by a screw or bolt **107** as best shown in Fig. 28B.

The panel member **10** may additionally include a conduit **16** also disposed in the polymeric foamed material **12**, preferably transversely disposed therein and generally normal with respect to the brace members **14**. The conduit **16** passes into a transverse polymeric opening **17** (see Figs. 10 and 11) in the polymeric foamed material **12**. In the embodiment of the invention shown in Figs. 15-35, the polymeric foamed material **12** in the panel member **10** is provided with a longitudinal (and/or vertical) polymeric opening **15** which is preferably for receiving a conduit **19** (see Fig. 36). The conduits **16** and **19** may be employed for any suitable use; for example, a utility receptor (e.g. electrical wires), water, gas, etc. The polymeric openings **15** and **17** as well as slot **30** are preferably formed with at least one seared or cartherized wall **32**. Cartherizing and/or searing the wall(s) of the polymeric openings **15** and **17** and/or slot **30** hardens and smoothes the wall(s) to facilitate the sliding of the conduits **16** and **19** and to brace member(s) **14** thereinto. As will be further

explained below, the seared or cartherized wall **32** is preferably formed by hot wire cutting.

The panel member **10** may also additionally include an internal reinforcing member, generally illustrated as **23** in Fig. 36. The reinforcing member **23** includes a male end **23m** and a female end **23f**. When two panels **10-10** are placed next to each other in a side-to-side relationship for assembling a structure, the male end **23m** of one reinforcing member **23** in one panel **10** slidably lodges into the female end **23f** of the other panel **10**, as best shown in Fig. 37. The reinforcing member **23** lodges in a transverse polymeric opening **25**, which is formed similarly as transverse polymeric opening **17** is formed. The reinforcing member **23** preferably extends from a tongue (identified as "**24**" below) on one end of the panel member **10** to a channel (identified as "**26**" below) on the other end of the panel member **10**. Thus, the male end **23m** of the reinforcing member **23** would protrude from a tongue while the female end **23f** of the reinforcing member **23** would communicate with a channel. Transverse polymeric opening **25** is formed with at least one seared or cartherized wall **32** to facilitate the sliding of the reinforcing member **23** thereinto.

Each of the brace members **14** has an opening **18** that has a circumference (or perimeter) which is larger than the circumference (or perimeter) of the conduit **16** and larger than the circumference (or perimeter) of the polymeric opening **17** such that after any and all openings **18** have been aligned with any and all polymeric openings **17**, the conduit **16** may pass through a respective polymeric opening **17** and through a respective polymeric opening **18** in the brace members **14**, preferably without contacting any of the circumferential perimeter of the opening **18** and be supported in a suspended relationship with respect thereto by the polymeric foamed material **12**. When ever "perimeter" is stated in the specification and in the claims, it is to be understood to mean any boundary of any opening (e.g. a square opening, a circular opening, etc.) Thus, the term "perimeter" is to include opening, circumference.

For the embodiment of the invention shown in Figs. 36 and 37, each of the brace members **14** would have an additional opening **18** that has a circumference (or perimeter) which is larger than the circumference (or perimeter) of the internal reinforcing member **23** and larger than the circumference (or perimeter) of the polymeric opening **25** such that after any and all additional openings **18** have been aligned with any polymeric opening **25**, the internal reinforcing member **23** may lodge in the polymeric opening **25** and pass through the additional opening **18** in the brace members **14**, preferably without contacting any of the circumferential perimeter of the additional opening **18** such as to be supported in a suspended relationship with respect thereto by the polymeric foamed material **12**.

Each of the panel members **10** also preferably includes ends **20** and **22** (each a defined edge). End **20** is formed with a tongue **24** and the end **22** is formed with a channel **26**. Formation of the tongue **24** and/or the channel **26** is preferably accomplished by cutting (preferably hot wire cutting) a portion **36** (see Fig. 8) of polymeric foamed material **12** off of the end **20** and/or end **22** respectively. As best shown in Fig. 13, a pair of panel members **10-10** may be interengaged by sliding the tongue **24** of end **20** into the channel **26** of end **22** to form a structure. As further best shown in Fig. 13, each of the panel members **10** includes the brace member **14** having the opening **18** with the conduit **16** passing through and between the two interengaged panel members **10-10** such that the polymeric foamed material **12** of each of the panel members **10** supports the conduit **16** in a space relationship with respect to the perimeter (i. e. circumference) of each of the openings **18**. In other words, the conduit **16** is preferably not to contact any part of the brace member **14**.

The polymeric foamed material **12** of the present invention may be any suitable material that is capable of producing the panel **10** of the present invention, preferably a suitable material that is capable of being cut and/or burned and/or melted (i.e. hot wire cut or melted) to produce the panel **10** of the present invention. The polymeric foamed material **12**

may be either high density and/or low density polymeric material. The polymeric foamed material **12** provides significant insulating qualities and thereby reduces heat and cooling costs as compared with conventional fiberglass batt insulation of equal thickness. Furthermore, the polymeric foamed material **12** in combination with the plurality of brace members **14** may be customized to provide complete design flexibility and superior structural advantages in shear strength and lateral load capability. The polymeric foamed material **12** exhibits a high strength to weight ratio and also exhibits superior insulating properties. The polymeric foamed material panel **10** provides both a structure and a substrate for the interior and exterior finishes.

Suitable polymeric foamed materials **12** have been discovered to be heat expandable plastic materials, such as pelletized polystyrene and the like. Other suitable heat expandable plastic materials that are within the spirit and scope of the present invention for the polymeric foamed material **12** is polyethylene, polyurethane, polypropylene, polyvinylchloride, etc., all being at a density to provide good thermal insulation and strength. The density is preferably of the order of about 1/2 pound per cubic foot to about 8 pounds per cubic foot. A density of from about 1 pound per cubic foot to about 3 pounds per cubic foot has been found to provide very good thermal properties as well as excellent physical properties including strength.

The heat expandable plastic material also provides for excellent burn-back or melt-back qualities when cut by a laser cutter (not shown) or by a hot wire cutter (identified as **"50"** below). When the below identified hot wire cutter cuts the heat expandable plastic material, the material typically burns and melts, more specifically melts back, to form the polymeric openings **15**, **17** and **25** and slot **30** within the polymeric foamed material **12**. Prior to commencing the formation of polymeric openings **15**, **17** and **25** and/or slot **30** (i.e. a brace-receiving-configuration or brace-receiving configured slot **30**) within the polymeric foamed material **12**, the below identified hot wire cutter cuts and/or burns and/or melts back from a surface

74 (i.e. a defined surface **74**) a slot **70** (preferably a generally straight thread-like slot **70** with a seared wall **32**) down to a point **72** (i.e. a preconfiguration cut point **72**) whereafter the below identified hot wire cutter cuts and/or burns and/or melts back the heat expandable plastic material to produce the polymeric openings **15**, **17** and **25** and/or slots **30**. The polymeric opening **17** is more technically produced after a residual core **12A** (see Fig. 11) is removed in any suitable manner or by any suitable means. The polymeric openings **15** and **25** are similarly produced, with the residual cores for polymeric openings **15** and **25** not being shown.

Certain epoxy resinous materials have also been discovered to be suitable polymeric foamed material **12**. Other suitable polymeric foamed material(s) **12** for the present invention include a rigid polystyrene, polyurethane, or polyisocyanurate foam or styrofoam. The polymeric foamed material **12** of the present invention provides for prefabricated panels **10** that may be easily installed at a building site for constructing a house, an industrial building, or any other structure, generally illustrated as **40** in Figs. 2 and 2A.

The most preferred polymeric foamed material **12** from which the panel **10** is to be constructed is expanded polystyrene beads. It is lightweight, quite strong and has excellent insulating qualities. On an outside wall **42** (see Fig. 6) of the polymeric foamed material panel **10**, a sheet of outer skin facing material **46** (such as one or more asbestos cement sheet, plywood, reconstituted timer sheeting, flat steel sheet, profiled steel sheet, rigid plastic sheet or flexible metal or plastic film or various combinations of outer skins) may be mounted or secured thereto. Examples of other exterior finishes which may be applied include one or more of: EIFS, stucco, metal cladding roofing material, ceramic tiling, wood, vinyl or other treatment customarily used in building construction. On an inside wall **48** (see Fig. 6 again) of the polymeric foamed material panel **10**, a sheet of inner skin facing material **49** (e.g. sheet rock or the like) may be mounted or secured thereto. The sheet of inner skin

facing material **49** may be any one or more suitable material(s) customarily employed in finishing the inside walls, roofs, etc., in building construction.

A hot wire cutter assembly, generally illustrated as **50** (see Fig. 7), is preferably provided for cutting and searing purposes. The hot wire cutter assembly **50** is electrically engaged to a computer **52** via one or more conductors **54**. The hot wire cutter assembly **50** is typically mounted on a table assembly **56** whereupon polymeric foamed material **12** is placed to be hot wire cut. The hot wire cutter assembly **50** includes at least one wire **58** for receiving current to be heated and to be moved for cutting and searing proposes in accordance with commands from the computer **52**, or from manual commands.

The hot wire cutter assembly **50** may be any suitable hot wire cutter assembly that is capable of cutting the desired slots (e.g. generally C-shaped or Z-shaped slots **30** and generally vertical or straight thread-like slots **70**, etc.) and openings (e.g. polymeric openings **17**, etc.) in the polymeric foamed material **12**. A suitable hot wire cutter assembly **50** is commercially available from Starr Mfg., Inc., a division of Starr Foam, Inc. of Fort Worth, Texas. The computer **52** to operate the hot wire cutter assembly **50** may also be obtained from Starr Mfg., Inc. The wire(s) **58** of the hot wire cutter assembly **50** preferably has a diameter ranging from about .03 inch to about .07 inch, more preferably from about .04 inch to about .06 inch. The wire(s) **58** typically receives less than approximately ten (10) amps at a difference of potential of about 110 volts. At a difference in potential of about 220 volts the wire(s) **58** would receive less than about five (5) amps. It is to be understood that the wire **58** may have any suitable diameter, and operate at any suitable voltage or amperage, for practicing the present invention.

Referring in detail now to Figs. 15-18, there is seen another embodiment for the hot wire cutter assembly **50** as comprising a plurality of wires **58** for cutting through a block, generally illustrated as **8**, of polymeric foamed material **12**. The hot wire cutter assembly **50** is available commercially from HP Machine, 1600 West Acoma Blvd., Lake

Havasu, Arizona 86403, under product model number: Model S-TEL-9000 CNC. The hot wire cutter assembly **50** includes a table assembly, generally illustrated as **120**, upon which the block **8** of polymeric foamed material **12** lies while movement of the plurality of wires **58** during the cutting procedure are controlled by a computer control assembly **200** (see Fig. 18). The wires **58** of the hot wire cutter assembly **50** for the embodiment of the invention shown in Figs. 15-18 preferably have a diameter ranging from about .03 inch to about .07 inch, more preferably from about .04 inch to about .06 inch. The wires **58** typically receive less than approximately ten (10) amps at a difference of potential of about 110 volts. At a difference in potential of about 220 volts the wires **58** would receive less than about five (5) amps. It is to be understood that the wires **58** may have any suitable diameter, and operate at any suitable voltage or amperage, for practicing the present invention.

The table assembly **120** includes a table **124** having a pair of generally identical horizontal track assemblies **128-128** connected thereto. A horizontal trolley assembly **130** is slidably mounted to each of the horizontal track assemblies **128**. Only one of the horizontal trolley assemblies **130** is shown in Fig. 16, with the other horizontal trolley assembly **130** (not shown) being broadly referenced by a broken-line arrow from **130**. The table assembly **120** also includes a support harp **134** having a horizontal support section **136** and a pair of opposed vertical support sections **138-138** integrally bound to the horizontal support section **136**. As best shown in Fig. 17, the respective vertical support sections **138** are supported respectively by one of the horizontal trolley assemblies **130** such that when both of the horizontal trolley assemblies **130-130** move in a certain horizontal direction, the support harp **134** also moves in the same horizontal direction. Each of the vertical support sections **138** slidably supports a vertical trolley assembly **150** to which the plurality of wires **58** couple such that when the vertical trolley assemblies **150-150** are moved by the computer control assembly **200** in a certain vertical direction, the plurality of wires **58** move

accordingly in the same vertical direction. Thus, computer control assembly **200** for the present invention, may move the wires **58** either horizontally or vertically, or both horizontally and vertically simultaneously to form any desired shape for the slots **30** or form the cylindrical shaped polymeric openings **15**, **17** and **25**.

The horizontal track assemblies **128** each include a main table frame **154** having a horizontal trolley track **156** as best shown in Fig. 17. As further best shown in Fig. 17, the horizontal trolley assembly **130** comprises a horizontal trolley **160** slidably mounted along the horizontal trolley track **158**, a horizontal locking assembly **164** for locking the horizontal trolley **160**, and a drive brace **168** bound to the horizontal trolley **160** and coupled to a horizontal drive cable **170** such that when the horizontal drive cable **170** is moved in a certain horizontal direction by hand or by a motor (identified as "M_H" below), the drive brace **168** also moves, causing the horizontal trolley **160** to also move, in the same certain horizontal direction. The horizontal drive cable **170** is also similarly engaged and coupled to the other horizontal trolley assembly **130** (not shown) through a series of pulleys (not shown) underneath the table **124** such that both horizontal trolley assemblies **130-130** are capable of being moved in unison and in the same horizontal direction by a motor (identified as "$\mathbf{M_H}$" below). As was previously indicated, when the horizontal trolley assemblies **130-130** are moved in a certain horizontal direction, the support harp **134** (and the wires **58**) also moves in the same certain horizontal direction.

Each of the vertical trolley assemblies **150** include a sleeve **174** movably engaged to one of the vertical support sections **138** of the support harp **138**, as best shown in Figs. 16 and 17. Each of the vertical trolley assemblies **150** have a manual actuation knob **176**, a vertical locking mechanism **178**, and a vertical drive cable **180** coupled to the sleeve **174**. The plurality of wires **58** are coupled to the sleeve **174** such as to move vertically therewith. When the vertical drive cable **180** is moved in a certain vertical direction by a motor (identified as "M_V" below), the sleeve **174** (along with the

plurality of wires **58** coupled thereto) also moves in the same certain vertical direction. The vertical drive cable **180** is also similarly engaged and coupled to the sleeve **174** of the other vertical trolley assembly **150** through a series of pulleys (not shown) such that both vertical trolley assemblies **150-150** are capable of being moved in unison and in the same vertical direction by hand or by a motor (identified as "M_V" below). As previously mentioned, when the vertical trolley assemblies **150-150** are moved in a certain vertical direction along the vertical support section **138** of the support harp **134**, the wires **58** also move in the same certain vertical direction. As best shown in Fig. 17, an electrical conductor **186** is coupled to the wires **58** and communicates with a power source for conducting electrical power from the power source to the wires **58** for heating the same.

Referring now to Fig. 18 for the computer assembly **200** of the present invention, there is seen the computer **52** electrically engaged to a CNC controller **210** via at least one conductor **214**. CNC controller **210** is electrically engaged to motor $\mathbf{M_V}$, to motor $\mathbf{M_H}$ and to power box **220** via conductor **222**, conductor **224**, and conductor **228** respectively. Power box **220** communicates with a power source through at least one conductor **230** for receiving electrical power and administering the same to the CNC controller **210** through conductor **228**. Through a program in the computer **52**, appropriate signals are sent to the CNC controller **210** which in turn releases and/or allocates electrical power to the two motors $\mathbf{M_V}$ and $\mathbf{M_H}$ based on the signals received from the computer **52**. As was previously indicated, the motors $\mathbf{M_V}$ and $\mathbf{M_H}$ respectively control the vertical and horizontal movement of the wires **58** by moving the vertical trolley assemblies **150** and the horizontal trolley assemblies **130** respectively. The computer control assembly **200** is available commercially from HP Machine, 1600 West Acoma Blvd., Lake Havasu, Arizona 86403.

Continuing to refer to the drawings for operation of the invention and the method for producing the panel **10**, the polymeric foamed material **12** is placed upon the table assembly **56** and under (i.e. laterally adjacent to) the wire **58** of the

hot wire cutter assembly **50**. While operation of the invention is being initially illustrated with respect to a wire cutter assembly **50** having a single wire **58**, a wire cutter assembly **50** having a plurality of wires **58** would operate similarly. Commands are entered into the computer **52** and the wire **58** is heated to a desired temperature (e.g. from about 230°F to about 580°F, preferably from about 250°F to about 350°F) and the now hot wire **58** is lowered against the surface **74** and commences to cut and/or burn and/or melt back the polymeric foamed material **12** to produce the generally straight thread-like vertical slot **70**. The slot **70** is continually formed or produced until the hot wire **58** reaches point **72** (see Fig. 9) whereupon the computer **52** sends another signal to the hot wire cutter assembly **50**, causing the hot wire **58** to be moved in an essentially generally C-shaped path (as represented by dotted lines in Fig. 9) to produce an essentially generally C-shaped slot **30**. One or more of these slot(s) **30** may be formed in the polymeric foamed material **12**. As best shown in Fig. 9, two slot(s) **30** were produced in the polymeric foamed material **12**.

After the hot wire **58** has cut the slot(s) **30** and **70**, the cutting path(s) is reversed by commands from the computer **52** such that the hot wire **58** reversely retraces its initial cutting path(s), which reverse retracing typically causes more burning and/or melt back of polymeric foamed material **12** contiguous to the slot(s) **30** and **70**. In reverse retracing of its initial cutting path, the hot wire **58** is "cleaning out" the slot(s) **30** and slot(s) **70** that terminate in slot(s) **30** for further defining the slot(s) **30** and **70**, especially slot **30** which is of an opening between opposed perimetrical boundaries approximating the thickness of the brace member **14** for snugly receiving the brace member **14** to essentially fully encapsulate the same. Preferably, slot(s) **30** have openings that are greater than the opening of slot(s) **70** that terminate in slot(s) **30**. In reverse retracing of its initial cutting path(s), the hot wire **58** further sears and/or cartherizes the seared wall(s) **32** of the slot(s) **70** and **30** to further harden and smooth the same. After the hot wire **58** has reversely

retraced its initial cutting path(s), the hot wire **58** exits out of slot **70** that terminates in slot **30** and is subsequently elevated above the surface **74**.

After forming the desired number of slot(s) **30**, the polymeric foamed material **12** is subsequently preferably rotated on top of the table assembly **56** in order to posture the polymeric foamed material **12** for formation of the polymeric opening(s) **17**. This obviously is an optional step since there are times that the polymeric foamed material panel **10** is to be produced without any polymeric opening(s) **17**. The amount of rotation of the polymeric foamed material **12** for forming polymeric opening(s) **17** would be any suitable amount to accomplish the desired cutting results. Preferably, for a square or rectangular shaped polymeric foamed material **12** as shown in Figs. 9 and 10, the rotation would be approximately 90° such that the polymeric opening **17** to be formed would be generally normal to the slot(s) **30**.

In forming the polymeric opening **17**, the hot wire **58** is lowered by the hot wire cutter assembly **50** against the surface **74** and another slot **70** is commenced to be cut by the hot wire **58**. The slot **70** is continually cut until a point **72** (i.e. a preconfiguration cut point **72**) is again reached whereupon the computer signals the hot wire cutter assembly **50** to move the hot wire **58** in a circular fashion or manner to cut and/or burn and/or melt back polymeric foamed material **12** such that when the core material **12A** is removed, the polymeric opening **17** is produced with slot **70** terminating in polymeric opening **17**. As previously indicated, removal of the core material **12A** may be by any suitable means including manual removal of it.

As was seen in the production of slot(s) **30** and **70**, after the hot wire **58** has cut polymeric opening **17** (i.e. cylindrical polymeric opening **17**) and slot(s) **70** that terminate in polymeric opening(s) **17**, the cutting path(s) (e.g. a cylindrical cutting path) is reversed by commands from the computer **52** such that the hot wire **58** reversely retraces its initial cutting path(s) in the formation of polymeric opening **17**. Such reverse retracing causes more burning and/or melt back of polymeric foamed material **12** contiguously or

juxtaposedly exposed on the initially seared wall(s) **32** of the polymeric opening **17** and the slot(s) **70**. In reverse retracing of its initial cutting path(s), the hot wire **58** is also further searing and/or cartherizing the wall (i.e. the cylindrical wall) around the core material **12A** to further smooth and harden the same to facilitate the removal of the core material **12A**. As was previously indicated for the formation of slot(s) **30**, by reversely retracing its initial cutting path(s), the hot wire **58** is "cleaning out" the polymeric opening(s) **17** and slot(s) **70** terminating in polymeric opening(s) **17** for further defining polymeric opening(s) **17** and slot(s) **70**, especially the polymeric opening(s) **17** which for cylindrical polymeric opening(s) **17** have a diameter that approximates the diameter of conduit **16** for snugly receiving conduit **16** to essentially fully encapsulate the same. Also by reverse retracing of its initial cutting path(s), the hot wire **58** further sears and/or cartherizes the seared wall(s) **32** of polymeric opening(s) **17** and the slot(s) **70** terminating in the polymeric opening (s) **17** to further harden and smooth the same. After the hot wire **58** has reversely retraced its initial cutting path(s) in the formation of polymeric opening(s) **17**, the hot wire **58** exits out of the slot **70** terminating in the polymeric opening **17** and is then elevated above the surface **74**.

After the core material **12A** has been removed from polymeric opening **17**, the brace member **14** (see Fig. 10) is aligned with the general C-shaped slot **30** (see Fig. 10) and is subsequently pushed into the cut slot **30** such that the brace member **14** would preferably extend from one extremity of the polymeric foamed material **12** to another extremity of the polymeric foamed material **12**. In order words, it is preferred that the brace member **14** extends entirely through the polymeric foamed material **12** such that ends of the brace member **14** are exposed at opposed ends of the polymeric foamed material **12**. This enables a more optimal load-bearing function for the brace members **14**. Each brace member **14** is preferably inserted into each slot **30**.

The brace members **14** may be typically provided with the opening (s) **18** which is capable of being aligned with the polymeric opening(s) **17** when and after the brace member(s) **14** are slid into the slot(s) **30** (i.e. preferably generally C-shaped slot(s) **30**) in the polymeric foamed material **12**. After such alignment, one or more panels **10** may be sent to a construction site such that two or more of the panel(s) **10** may be combined in any desired manner (e.g. contiguous as shown in Figs. 4 and 5 or aligned as shown in Fig. 13) to produce a structure **40**. When postured in an alignment in accordance with Fig. 13, the conduit **16** may be slid through the polymeric opening(s) **17** and through the opening(s) **18** (see Fig. 1) in the brace member(s) **14**, preferably such that the conduit **16** is supported by the polymeric foamed material **12** in the two or more panels **10** and preferably such that the conduit **16** does not contact any perimeter of the opening(s) **18** in the brace member(s) **14**.

The tongue **24** and the channel **26** may be cut in the opposed ends **20** and **22** of the polymeric foamed material **12** at any desired time. More specifically, the tongue **24** and the channel **26** may be cut after the generally C-shaped slot(s) **30** and polymeric opening(s) **17** have been cut in the polymeric foamed material **12**, or the tongue **24** and the channel **26** may be cut before the generally C-shaped slot(s) **30** and polymeric opening(s) have been cut in the polymeric foamed material **12**. After the tongue **24** and the channel **26** have been formed, any wall(s) that the hot wire **58** has contacted is or becomes seared wall(s) **32**. Thus, the wall(s) of the channel **26** and the tongue **24** are seared wall(s) **32**.

Continuing to refer to the drawings for operation of another preferred embodiment of the present invention including the method(s) for producing the panel **10**, the block **8** of the polymeric foamed material **12** is placed upon the table **124** of the table assembly **120** and next (i.e. laterally adjacent) to the wires **58** of the hot wire cutter assembly **50**. The wires **58** are positioned along a side **8s** (see Figs. 15 and 16) of the block **8** of the polymeric foamed material **8**. The wires **58** are heated to a desired temperature (e.g. from about

230°F to about 580°F). The computer control assembly **200** may be programmed to cause the motors $\mathbf{M_H}$ and $\mathbf{M_V}$ to move the wires **58** in any desired direction for any desired distance such that a plurality of panels **10** may be produced from the block **8** of polymeric foamed material **12**. Preferably, the wires **58** are caused to be initially moved by the computer control assembly **200** to cut a plurality of tongues **24** in the side **8s** of the block **8** of polymeric foamed material **8**. After the tongues **24** have been formed (see Figs. 15 and 16), the wires **58** are caused to be moved by the computer control assembly **200** to subsequently cut a plurality of slots **30** in the block **8** of polymeric foamed material **12** and to sever the block **8** into a plurality of polymeric foamed materials **12** (i.e. a plurality of polymeric foamed material structures **12s** shown in Fig. 19), with each polymeric foamed material structure **12s** having a plurality of slots **30**, and preferably, at least one polymeric foamed material opening **15**.

The slots **30** may be of any desired shape or configuration to receive a comparable shaped or configured stud or brace **14**. Preferably, the slots are generally C-shaped, as shown in Fig. 19 and Fig. 32. Alternatively and preferably further, the slots **30** may be partially Z-shaped (see Fig. 29) to partially receive a Z-shaped brace **14** such that when a Z-shaped brace **14** is slid into the partially Z-shaped slot **30**, a portion of Z-shaped brace **14** protrudes away from the polymeric foamed material **12**, as best shown in Fig. 30. The slots **30** may be partially C-shaped (see Fig. 26) to partially receive a C-shaped brace **14** such that when a C-shaped brace **14** is slid into the partially C-shaped slot **30**, a portion of the C-shaped brace **14** protrudes away from the polymeric foamed material **12**, as best shown in Figs. 27 and 28B. The polymeric openings **15** are preferably cylindrical openings for receiving the conduits **19**.

After the slots **30** and polymeric openings **15** have been cut and the plurality of polymeric foamed material structures **12s** have been produced (see Fig. 19) from the block **8** of polymeric foamed material **12**, the computer control assembly **200** preferably causes the wires **58** to be moved to cut a

plurality of channels **26** in the side of the block **8** of the polymeric foamed material **12** opposed to the side **8s**. Subsequently, the plurality of polymeric foamed material structures **12s**, while remaining in a stacked or superimposed relationship, are rotated 90 degrees to posture the stacked polymeric foamed material structures **12s** for formation of the track chases **100** and the transverse polymeric opening(s) **17** and **25** if desired. The wires **58** are moved by computer control assembly **200** such that the track chases **100** are formed in each of the polymeric foamed material structures **12s** at any desired location, preferably at the location shown in Figs. 25-31. The transverse polymeric openings **17** may be formed in the respective polymeric foamed material structures **12s** by passing each wire **58** in an initially cut path between any two superimposed polymeric foamed material structures **12s-12s** and either raising or lowering the wire **58** against the respective surface **74** (e.g. see Fig. 10) of a respective polymeric foamed material structure **12s** and respective slots **70** are commenced to be cut by each of the hot wires **58**. The respective slots **70s** are continually cut until respective points **72** (i.e. preconfiguration cut points **72**) are reached whereupon the computer **52** signals the hot wire cutter assembly **50** to move the hot wires **58** in a circular fashion or manner to cut and/or burn and/or melt back polymeric foamed material **12** such that when respective core materials **12A** are removed, the polymeric opening **17** is produced in each of the polymeric foamed material structures **12s** with a respective slot **70** terminating in a respective polymeric opening **17**. As previously indicated, removal of the core material **12A** may be by any suitable means including manual removal of it. Polymeric openings **25** may be formed in the same manner after a core material (not shown, but similar to core material **12A**) has been removed. As was previously indicated, conduits **16** and internal reinforcing member **23** are to be respectively inserted into the polymeric openings **17** and into the polymeric openings **25**.

Referring now to Figs. 19-25 for the procedure of cutting generally C-shaped slots **30** as shown in the respective

polymeric foamed material structures **12s**, the plurality of hot wires **58** are moved by the computer control assembly **200** in direction of the arrow **300** (see Fig. 20) for a desired distance. The wires **58** are then moved in direction of the arrow **302** (which is preferably normal to the direction of the arrow **300**) for a distance which approximates the length of a flange return **14r** of a generally C-shaped brace member **14**. Wires **58** are subsequently moved a predetermined distance **L** (see Fig. 24) in direction of the arrow **304** into an off-set position. The distance **L** is preferably equal to about the measurement of the diameter **D** (see Fig. 23) of one of the wires **58**. The direction of the arrow **304** is preferably a direction which is generally perpendicular to direction of arrow **302**. From the off-set position the wires **58** move in direction of the arrow **306** for a distance which is less than distance that the wires **58** moved when travelling in direction of the arrow **302**. When the wires **58** are travelling in direction of the arrow **306**, they are forming an off-set path next to the path that the wires **58** formed in travelling the direction of arrow **302**. The width **W** of the off-set path is approximately equal to twice the measurement of the diameter **D** of the wires **58** (see Fig. 24).

After travelling a distance in direction of the arrow **306** which is less than the distance that the wires travelled in direction of the arrow **302**, the wires **58** travel in direction of the arrow **308** (see Fig. 20 again). The direction of the arrow **308** is generally normal to the direction of the arrow **306**. After travelling a desired distance along a path in direction of the arrow **308**, the wires are then moved by the computer control assembly **200** in direction of the arrow **310**. It should be understood that the distance that the wires **58** travelled in direction of the arrow **308** is approximately equal to the length of a flange **14f** of a generally C-shaped brace member **14**. The distance that the wires **58** travelled in direction of the arrows **308** is also approximately equal to the width of a polymeric material crest **12c** (see Fig. 20B), with the height of the polymeric material crest **12c** resulting from the wires **58** travelling at a distance in direction of the

arrow **306** that is less than the distance that the arrows travelled in direction of the arrows **302**. Polymeric material crest **12c** also results from a polymeric material recess **12r** being formed (see Fig. 20B again).

The wires **58** travel a distance in direction of the arrow **310**, which distance is approximately equal to the length of a web **14f** of a generally C-shaped brace member **14**. From the direction of the arrow **310**, the wires **58** travel in direction of the arrow **312** for a distance that approximately equals the distance that the wires **58** travelled in direction of the arrow **308**. The direction of the arrow **312** is generally perpendicular to the direction of the arrow **310**. The wires **58** subsequently travel in direction of the arrow **314** for a distance that approximately equals the distance that the wires **58** travelled in direction of the arrow **306**. From direction of the arrow **314**, the wires **58** are then moved in direction of the arrow **316** for a predetermined distance which is preferably equal to the predetermined distance **L** (see Fig. 24). The wires **58** are now in another off-set position. From this off-set position, the wires **58** generally retrace the path that the wires **58** cut when moving in direction of the arrows **310**, **312** and **314**. While retracing this path, the wires **58** remain in the off-set position. In retracing the path that the wires **58** made when moving in direction of the arrows **310**, **312** and **314**, the wires **58** move in direction of the arrows **318**, **320** and **322**, as best shown in Fig. 20. The distance that the wires **58** travel in direction of the arrow **318** is generally equal to the distance that the wires **58** travelled when travelling in the direction of the arrow **302**. The direction of the arrow **320** is generally normal to the direction of arrows **318** and **322**. After having moved in direction of the arrows **318, 320** and **322** to form an off-set path next to the path that the wires **58** formed when moving in direction of the arrows **310**, **312**, and **314**, the wires **58** then move in direction of the arrow **324**. The generally C-shaped slot **30** of Figs. 19, 20, and 25 has now been formed.

By the practice of the present invention there is provided a method for producing the polymeric foamed material

panel **10** (e.g. a low density synthetic panel) comprising the steps of: (a) providing the polymeric foamed material **12**; (b) cutting (e.g. with one or more wires **58**) the polymeric foamed material **12** of step (a) until reaching the preconfiguration cut point **72**; (c) cutting subsequently from the preconfiguration cut point **72** the brace-receiving configuration (i.e. the slot **30**) in the polymeric foamed material **12**; and (d) sliding the brace member into the brace-receiving configuration (or the slot **30**) to produce the polymeric foamed material panel **10**. The cutting in step (b) and the cutting in step (c) comprises cutting the polymeric foamed material **12** of step (a) with the hot wire cutter assembly **50** which is preferably operated by the computer **52**. The cutters may also be laser cutters. The brace-receiving configuration in the polymeric foamed material **12** preferably comprises the slot **30** for receiving the brace member **14**. The slot **30** includes at least one seared wall **32** for facilitating the sliding of the brace member **14**. The brace member **14** includes the opening **18** with an opening perimeter. The method additionally comprises forming the polymeric (foamed material) opening **17** in the polymeric foamed material **12**. The polymeric foamed material opening **17** has a polymeric foamed material opening perimeter. The sliding in step (d) comprises sliding the brace member **14** into the brace-receiving configuration until the opening **18** of the brace member **14** is generally aligned with the polymeric (foamed material) opening **17**. The opening perimeter of the opening **18** in the brace member **14** has a dimension that is greater than **4** dimension of the polymeric foamed material opening perimeter of the polymeric (foamed material) opening **17** in the polymeric foamed material **12**.

By the practice of the present invention there is further provided a method for forming a structure **40** comprising the steps of: (a) providing a first polymeric foamed material **12** having a first defined edge **20** (i.e. end **20**); (b) cutting a first brace-receiving-configured slot **30** in the first polymeric foamed material **12**; (c) cutting the first defined edge **20** of the first polymeric foamed material **12** to form the tongue **24** on the first defined edge **20**; (d) sliding a first

brace member **14** into the first brace-receiving-configured slot **30**; (e) providing a second polymeric foamed material **12** having a second defined edge **22** (i.e. end **22**); (f) cutting a second brace-receiving-configured slot **30** in the second polymeric foamed material **12**; (g) cutting the second defined edge **22** of the second polymeric foamed material **12** to form the channel **26** in the second defined edge **22**; (h) sliding the second brace member **14** into the second brace-receiving-configured slot **30**; and (i) sliding the tongue **24** on the first defined edge **20** of the first polymeric foamed material **12** into the channel **26** in the second defined edge **22** of the second polymeric foamed material **12** to form the structure **40**.

By the further practice of the present invention there is also provided a polymeric foamed material panel **10** comprising a panel **10** consisting of the polymeric foamed material **12**; a brace-receiving-configured slot (i.e. slot **30** preferably) disposed in the polymeric foamed material **12** of the panel **10** and a brace member **14** disposed in the brace-receiving-configured slot **30** in the polymeric foamed material **12** of the panel **10**. The preferred brace-receiving-configured slot **30** includes at least one seared wall **32**; typically all walls of the slot **30** are seared. The polymeric foamed material panel **10** additionally comprises a generally straight thread-like slot **70** extending from a defined surface **74** of the polymeric foamed material **12** to the brace-receiving-configured slot **30**; and a second generally straight thread-like slot **70** extending from the defined surface **74** of the polymeric foamed material **12** to a generally cylindrical polymeric opening **17** in the polymeric foamed material **12**. All walls of the polymeric opening **17** are typically seared.

Practice of the present invention also provides method for producing a plurality of polymeric foamed material panels **10** comprising the steps of: (a) providing a block **8** of polymeric foamed material **12**; (b) cutting the polymeric foamed material **12** with a plurality of cutters (e.g. laser cutters or hot wires **58**) until each cutter reaches a respective preconfiguration cut point (i.e. preconfiguration cut point

72); (c) cutting subsequently with each cutter from the respective preconfiguration cut point of each cutter a respective brace-receiving slot **30** in the polymeric foamed material **12**; (d) cutting then the polymeric foamed material **12** with the plurality of cutters to produce a plurality of polymeric foamed material structures **12s** having a plurality of brace-receiving slots **30**; and (e) sliding a plurality of brace members **14** into the brace-receiving slots **30** of the polymeric foamed material structures **12s** to produce a plurality of polymeric foamed material panels **10**, each of the polymeric foamed material panels **10** having at least one of the brace members **14**. This method additionally comprises cutting with each cutter a respective polymeric foamed material opening (e.g. opening **15**, **17** or **25**) in the polymeric foamed material **12** such that each polymeric foamed material structure **12s** has a polymeric foamed material opening (e.g. opening **15**, **17** or **25**) to define a chase. The cutters are preferably computer operated to provide desired cut accuracy.

Another practice of the present invention provides a method for producing a plurality of polymeric foamed material panels **10** comprising the steps of: (a) providing a block **8** (e.g., a generally stationary block) of polymeric foamed material **12** (e.g., expanded polystyrene (EPS)); (b) cutting the polymeric foamed material **12** with a plurality of cutters (e.g., hot wire cutters, laser cutter, etc.) until each cutter reaches a respective preconfiguration cut point **72**; (c) cutting subsequently with each cutter from the respective preconfiguration cut point **72** of each cutter a respective brace-receiving slot **30** in the polymeric foamed material **12**; (d) cutting then the polymeric foamed material **12** with said plurality of cutters to produce a plurality of polymeric foamed material structures **12s** having a plurality of brace-receiving slots **30**, which may be linear or nonlinear slots; and (e) sliding a plurality of brace members **14** into the brace-receiving slots **30** of the polymeric foamed material structures **12s** to produce a plurality of polymeric foamed material panels **10**, each of the polymeric foamed material panels **10** having at least one of the brace members **14**. In the

immediate foregoing method of the present invention, the brace members **14** include sides. More particularly, each of the brace members **14** preferably comprises the web **14w**, the flanges **14f-14f** integrally bound to the web **14w**, and the flange returns **14r-14r** integrally bound to the flanges **14f-14f**. The web **14w**, the flanges **14f-14f**, and the flange returns **14r-14r** are surrounded by the polymeric foamed material **12**. Alternatively and as another embodiment of the present invention, a portion of at least one brace member **14** protrudes from each of the polymeric foamed material panels **10**. Therefore, the sliding step (e) in the immediate foregoing method more specifically comprises sliding one of the flanges **14f** and flange return **14r** associated therewith, and a portion of the web **14w** of respective brace members **14** into respective brace-receiving slots **30** of the polymeric foamed material structures **12s** to produce the plurality of polymeric foamed material panels **10**, with each of the polymeric foamed material panels **10** having the other flange **14f** and the flange return **14r** associated therewith, and a portion of the web **14w** of at least one of the brace members **14** disposed outside thereof.

An alternative practice of the present invention provides a method for producing a plurality of polymeric foamed material structures **12s** having slots **30** for receiving stud members **14** comprising the steps of: (a) cutting a polymeric foamed material **12** (e.g., a generally stationary block **8** of expanded polystyrene (ESP)) with a plurality of cutters, such as hot wire cutters or laser cutters, in a first direction (e.g. in direction of the arrow **300** in Fig. 20); (b) cutting subsequently in a second direction (e.g. in direction of the arrow **302** or arrow **310** in Fig. 20) the polymeric foamed material **12** with the plurality of cutters until each cutter forms a first respective slot in the polymeric foamed material **12**; (c) cutting in the first direction the polymeric foamed material **12** with the plurality of cutters to produce a plurality of polymeric foamed material structures **125** having a plurality of first slots (e.g. slot sections **$30r_1$** in Fig. 20), which may be linear or nonlinear slots. The immediately foregoing method broadly additionally comprises cutting the

polymeric foamed material **12** with the plurality of cutters until each cutter forms a second respective slot (e.g. slot section **30s** in Fig. 20) in the polymeric foamed material **12**. The immediate foregoing method more particularly additionally comprises cutting the polymeric foamed material **12** with the plurality of cutters until each cutter forms a respective recess (e.g. polymeric material recess **12r** in Fig. 20) in the polymeric foamed material **12**; and subsequently cutting the polymeric foamed material **12** with the plurality of cutters until each cutter forms a second respective slot (e.g. slot sections **30s** in Fig. 20) in the polymeric foamed material **12** such that after cutting, a plurality of polymeric foamed material structures are produced having a plurality of first slots (e.g. slot sections $\mathbf{30r_1}$) and a plurality of second slots (e.g. slot sections **30s**) and a plurality of recesses (e.g. polymeric material recesses **12r**). A plurality of stud members **14** is provided wherein each of the stud members **14** comprises a web **14w**, a first flange **14f** integrally bound to the web **14w**, a first flange return **14r** integrally bound to the first flange **14f**, a second flange **14f** also integrally bound to the web **14w**, and a second flange return **14r** integrally bound to the second flange **14f**. The stud members **14** are slid into the first and second slots and into the recesses of the polymeric foamed material structures **12s**, such that after the sliding step, the first flange return **14r** and the first flange **14f** of each of the stud members **14** occupies respectively one of the first slots (e.g. slot sections $\mathbf{30r_1}$) and one of the recesses (e.g. polymeric material recess **12r**) of the polymeric foamed material structures **12s**, and the web **14w**, the second flange **14f** and the second flange return **14r** of each of the stud members **14** occupies one of the second slots (e.g. slot section **30s**) of the polymeric foamed material structures **12s**. The cutters are preferably computer operated to provide the desired cut accuracy during the cutting steps.

Other features in alternative practices of the present invention include interrupting the movement of a plurality of cutters in a first direction of travel to move the cutters in at least one direction of travel which differs from the first

direction of travel in order to form one or more brace-receiving slots. These features are embodied in a method for producing a plurality of polymeric foamed material structures **12s** having brace-receiving slots **30** comprising the steps of: (a) providing a block **8** of polymeric foamed material **12**; and (b) moving a plurality of cutters through the block **8** of polymeric foamed material in a first direction (e.g. in direction of arrow **300** in Fig. 20) of travel, while interrupting at least one time the moving of the plurality of cutters in the first direction of travel to move the cutters through the block **8** of polymeric foamed material **12** in at least one direction of travel (e.g. in direction of arrow **302** or arrow **310** in Fig. 20) which differs from the first direction of travel, such that each cutter produces a respective brace-receiving slot **30** in the polymeric foamed material **12**, until the plurality of cutters have moved completely through the block **8** of polymeric foamed material **12** to produce a plurality of polymeric foamed material structures **12s** with each structure **12s** having at least one brace-receiving slot (e.g. slot sections **30s** and/or **30r**$_1$ in Fig. 20). These features are also embodied in a method for producing a plurality of polymeric foamed material structures **12s** having brace-receiving slots comprising the steps of: (a) providing a block **8** of polymeric foamed material **12** in a generally stationary position; (b) moving a plurality of cutters through the generally stationary block **8** of polymeric foamed material **12** in a first direction of travel (e.g. in direction of arrow **300** in Fig. 20); (c) interrupting the movement of the plurality of cutters from the first direction of travel through the generally stationary block **8** of polymeric foamed material **12** to move the cutters in at least one direction of travel (e.g. in direction of the arrow **302** in Fig. 20) which differs from the first direction of travel such that each cutter produces a respective brace-receiving slot (e.g. slot section **30r**$_1$ in Fig. 20) in the polymeric foamed material **12**, and (d) continuing the moving of the plurality of cutters in the first direction of travel, while intermittently interrupting the movement of the plurality of cutters from the

first direction of travel to move the cutters in at least one direction of travel (e.g. in direction of the arrow **310** in Fig. 20) which differs from the first direction of travel such that each cutter produces at least one additional respective brace-receiving slot (e.g. slot section **30s** in Fig. 20) in the polymeric foamed material **12**, until the plurality of cutters have moved completely through the generally stationary block **8** of polymeric foamed material **12** after which a plurality of polymeric foamed material structures **12s** are produced with each polymeric foamed material structure **12s** having a plurality of brace-receiving slots (e.g. slot sections **30s** and/or $\mathbf{30r_1}$ in Fig. 20).

In additional practices of the present invention there is broadly provided a method for producing a polymeric foamed material structure **12s** having a slot (e.g. slot section $\mathbf{30r_1}$ in Fig. 20) comprising the steps of: (a) cutting with a cutter a polymeric foamed material **12** until reaching a preslot cut point (e.g. the point where the hot wire **58** stops after being moved in direction of the arrow **300** in Fig. 20); (b) cutting subsequently a first path in the polymeric foamed material **12** with the cutter from the preslot cut point until reaching a first cut point (e.g. the point where the hot wire **58** stops after being moved in direction of the arrow **302** in Fig. 20); (c) moving the cutter in the polymeric foamed material **12** a predetermined distance (e.g. distance **L** in Fig. 24) from the first cut point to a second cut point (e.g. the point where the hot wire **58** stops after being moved in direction of the arrow **304** in Figs. 20 and 24); and (d) cutting subsequently from the second cut point a second path (e.g. an off-set path) in the polymeric foamed material **12** with the cutter until the cutter reaches a postslot cut point (e.g. the point where the hot wire **58** stops after being moved in direction of the arrow **306** in Figs. 20 and 24) to produce a polymeric foamed material structure **12s** having a slot (e.g. slot section $\mathbf{30r_1}$ in Fig. 20). In the immediate foregoing method of the present invention, the cutter is preferably a computer-operated hot wire cutter having a wire diameter **D** with a generally known diameter measurement, and the slot

(e.g. slot section **30r$_1$** in Fig. 20) has a width **W** equal to about twice the generally known diameter measurement of the wire diameter **D**, and a width **W** equal to about twice the predetermined distance (e.g. distance **L** in Fig. 24).

Further additional practices of the present invention broadly provide a method for producing at least one polymeric foamed material structure **12s** having at least one slot (e.g. slot section **30s** in Fig. 20) comprising the steps of: (a) providing at least one cutter; (b) cutting with the cutter a polymeric foamed material **12** until the cutter reaches at least one respective preslot cut point (e.g. the point where the hot wire **58** stops after being moved in direction of the arrow **308** in Fig. 20); (c) cutting subsequently with cutter from the respective preslot cut point at least one respective path in the polymeric foamed material **12** until the cutter reaches at least one first cut point (e.g. the point where the hot wire **58** stops after being moved in direction of the arrows **310**, **312** and **314** in Fig. 20); (d) forming with the cutter in the polymeric foamed material **12** at least one respective off-set path (e.g. the path taken by hot wire **58** in moving in direction of the arrows **318**, **320** and **322** in Fig. 20) communicating with the respective path to form at least one slot (e.g. slot section **30s** in Fig. 20) within the polymeric foamed material **12**; and (e) cutting subsequently the polymeric foamed material **12** with the cutter (e.g. in direction of the arrow **324** in Fig. 20) until the cutter has cut through the polymeric foamed material **12**, producing at least one polymeric foamed structure **12s** having at least one slot (e.g. slot section **30s** in Fig. 20). In the immediate foregoing method, the at least one respective path has at least one respective path length, and the at least one respective off-set path communicates with the at least one respective path along the at least one respective path length of the at least one respective path, such that the at least one respective path and the least one respective off-set path together form the at least one slot (e.g. slot section **30s** in Fig. 20) within the polymeric foamed material **12**.

Thus, practice of the present invention provides one or more polymeric foamed material panel(s) **10** which may be processed into any suitable blocks, for example, 4 feet by 4 feet by 24 feet. These blocks of polymeric foamed material **12** have been hot wired cut into an associated desired thickness as needed by the laminator/panel manufacturer. The polymeric foamed material panel(s) **10** of the present invention preferably encapsulate metal studs or braces **14** (as well as rafters if desired) in order to eliminate the need for plywood or OSB skins and the adhesives currently required in panel production. The metal studs **14** and rafters supply the structural engineering strength requirements.

The polymeric foamed material panel **10** becomes a pre-engineered "system" for building structures including, but not limited to, homes, apartments and commercial buildings or structures, as represented by structure(s) **40** in Figs. 2 and 2A. The polymeric foamed material panel(s) **10** of the present invention is an improvement over the prior art in that they become the structure, the insulation, and the substrate for the interior and exterior finishes. The polymeric foamed material panel(s) **10** and the method of the present invention are also an improvement over the prior art in that they provide a market ready product at a significantly lower cost by eliminating secondary processing steps. The polymeric foamed material panel(s) **10** may be used in tandem with traditional Stress Skin and Structural Panels when attachment of a specific product (e.g. asphalt shingles, etc.) to the panel(s) **10** requires a solid wood substrate.

While the present invention has been described herein with reference to particular embodiments thereof, a latitude of modification, various changes and substitutions are intended in the foregoing disclosure, and it will be appreciated that in some instances some features of the invention will be employed without a corresponding use of other features without departing from the scope and spirit of the invention as set forth. Therefore, many modifications may be made to adapt a particular situation or material to the teachings of the invention without departing from the

essential scope and spirit of the present invention. It is intended that the invention not be limited to the particular embodiment disclosed as the best mode contemplated for carrying out this invention, but that the invention will include all embodiments and equivalents falling within the scope of the appended claims.

WHAT IS CLAIMED IS:

1. A method for producing a plurality of polymeric foamed material structures having brace-receiving configurations comprising the steps of:

(a) providing a block of polymeric foamed material;

(b) cutting the polymeric foamed material of step (a) with a plurality of cutters until each cutter reaches a respective preconfiguration cut point;

(c) cutting subsequently with each cutter from the respective preconfiguration cut point of each cutter a respective brace-receiving configuration in the polymeric foamed material; and

(d) cutting, after said cutting step (c), the polymeric foamed material of step (c) with said plurality of cutters to produce a plurality of polymeric foamed material structures, each of said polymeric foamed material structures having a brace-receiving configuration.

2. The method of claim 1 wherein said cutting in step (b), said cutting in step (c), and said cutting in step (d) is with a plurality of laser cutters.

3. The method of claim 1 wherein said cutting in step (b), said cutting in step (c), and said cutting in step (d) is with a plurality of hot wire cutters.

4. The method of claim 1 wherein said polymeric foamed material is generally stationary.

5. The method of claim 2 wherein said polymeric foamed material is generally stationary.

6. The method of claim 3 wherein said polymeric foamed material is generally stationary.

7. The method of claim 1 additionally comprising cutting with each cutter, prior to said cutting step (d), a respective polymeric foamed material opening in the polymeric foamed material such that each polymeric foamed material structure has a polymeric foamed material opening to define a chase.

8. The method of claim 2 additionally comprising cutting with each cutter, prior to said cutting step (d), a respective polymeric foamed material opening in the polymeric foamed material such that each polymeric foamed material structure has a polymeric foamed material opening to define a chase.

9. The method of claim 3 additionally comprising cutting with each cutter, prior to said cutting step (d), a respective polymeric foamed material opening in the polymeric foamed material such that each polymeric foamed material structure has a polymeric foamed material opening to define a chase.

10. The method of claim 6 additionally comprising cutting with each cutter, prior to said cutting step (d), a respective polymeric foamed material opening in the polymeric foamed material such that each polymeric foamed material structure has a polymeric foamed material opening to define a chase.

11. The method of claim 10 wherein said polymeric foamed material comprises expanded polystyrene (EPS).

12. The method of claim 1 wherein said brace-receiving configuration in each of said polymeric foamed material structures is a non-linear brace-receiving configuration.

13. The method of claim 3 wherein said brace-receiving configuration in each of said polymeric foamed

material structures is a non-linear brace-receiving configuration.

14. The method of claim 4 wherein said brace-receiving configuration in each of said polymeric foamed material structures is a non-linear brace-receiving configuration.

15. The method of claim 11 wherein said brace-receiving configuration in each of said polymeric foamed material structures is a non-linear brace-receiving configuration.

16. The method of claim 1 additionally comprising computer operating said plurality of cutters.

17. The method of claim 3 additionally comprising computer operating said plurality of hot wire cutters.

18. The method of claim 6 additionally comprising computer operating said plurality of hot wire cutters.

19. A method for producing a plurality of polymeric foamed material panels comprising the steps of:

(a) providing a block of polymeric foamed material;

(b) cutting the polymeric foamed material of step (a) with a plurality of cutters until each cutter reaches a respective preconfiguration cut point;

(c) cutting subsequently with each cutter from the respective preconfiguration cut point of each cutter a respective brace-receiving slot in the polymeric foamed material;

(d) cutting, after said cutting step (c), the polymeric foamed material of step (c) with said plurality of cutters to produce a plurality of polymeric foamed material structures having a plurality of brace-receiving slots; and

(e) sliding a plurality of brace members into the brace-receiving slots of the polymeric foamed material structures of step (d) to produce a plurality of polymeric foamed material panels, each of said polymeric foamed material panels having at least one of said brace members.

20. The method of claim 19 wherein a portion of said at least one of said brace members protrudes from each of said polymeric foamed material panels.

21. The method of claim 19 wherein each of said brace members includes brace sides, and said brace sides of each of said brace members are surrounded by polymeric foamed material.

22. The method of claim 19 wherein said plurality cutters are hot wire cutters.

23. The method of claim 19 wherein said plurality cutters are laser cutters.

24. The method of claim 19 wherein said polymeric foamed material is generally stationary.

25. The method of claim 22 wherein said polymeric foamed material is generally stationary.

26. The method of claim 19 wherein said brace-receiving slots in said polymeric foamed material panels are non-linear brace-receiving slots.

27. The method of claim 22 wherein said brace-receiving slots in said polymeric foamed material panels are non-linear brace-receiving slots.

28. The method of claim 25 wherein said brace-receiving slots in said polymeric foamed material panels are non-linear brace-receiving slots.

29. The method of claim 19 additionally comprising computer operating said plurality of cutters.

30. The method of claim 22 additionally comprising computer operating said hot wire cutters.

31. The method of claim 28 additionally comprising computer operating said hot wire cutters.

32. The method of claim 19 wherein each of said brace members comprises a web, a first flange integrally bound to said web, and a second flange integrally bound to said web.

33. The method of claim 32 wherein said sliding step (e) further comprises sliding said first flange and a portion of said web of respective brace members into respective brace-receiving slots of said polymeric foamed material structures to produce said plurality of polymeric foamed material panels, each of said polymeric foamed material panels having said second flange and a portion of said web of at least one of said brace members disposed outside thereof.

34. The method of claim 32 wherein each of said brace members comprises a web, a first flange integrally bound to said web, a first flange return integrally bound to said first flange, a second flange integrally bound to said web, and a second flange return integrally bound to said second flange.

35. The method of claim 34 wherein said sliding step (e) further comprises sliding said first flange and said first flange return and a portion of said web of respective brace members into respective brace-receiving slots of said polymeric foamed material structures to produce said plurality

of polymeric foamed material panels, each of said polymeric foamed material panels having said second flange and said second flange return and a portion of said web of at least one of said brace members disposed outside thereof.

36. A method for producing a plurality of polymeric foamed material structures having slots for receiving stud members comprising the steps of:

(a) cutting a polymeric foamed material with a plurality of cutters in a first direction;

(b) cutting subsequently in a second direction the polymeric foamed material of step (a) with the plurality of cutters until each cutter forms a first respective slot in the polymeric foamed material;

(c) cutting, after said cutting step (b), in said first direction the polymeric foamed material of step (b) with the plurality of cutters to produce a plurality of polymeric foamed material structures having a plurality of first slots.

37. The method of claim 36 additionally comprising cutting, prior to said cutting step (c), the polymeric foamed material of step (b) with the plurality of cutters until each cutter forms a second respective slot in the polymeric foamed material.

38. The method of claim 36 additionally comprising cutting, prior to said cutting step (c), the polymeric foamed material of step (b) with the plurality of cutters until each cutter forms a respective recess in the polymeric foamed material; and subsequently cutting, prior to said cutting step (c), the polymeric foamed material with the plurality of cutters until each cutter forms a second respective slot in the polymeric foamed material such that after said cutting step (c), a plurality of polymeric foamed material structures are produced having a plurality of first slots and a plurality of second slots and a plurality of recesses.

39. The method of claim 38 additionally comprising providing a plurality of stud members wherein each of said stud members comprises a web, a first flange integrally bound to said web, a first flange return integrally bound to said first flange, a second flange integrally bound to said web, and a second flange return integrally bound to said second flange.

40. The method of claim 39 additionally comprising sliding said stud members into said first and second slots and into said recesses of said polymeric foamed material structures.

41. The method of claim 40 wherein after said sliding step, said first flange return and said first flange of each of said stud members occupies respectively one of said first slots and one of said recesses of said polymeric foamed material structures.

42. The method of claim 41 wherein said web, said second flange and said second flange return of each of said stud members occupies one of said second slots of said polymeric foamed material structures.

43. The method of claim 36 wherein said plurality of cutters are hot wire cutters.

44. The method of claim 36 wherein said cutters are laser cutters.

45. The method of claim 38 wherein said second slots are non-linear slots.

46. The method of claim 36 wherein said polymeric foamed material is generally stationary.

47. The method of claim 36 additionally comprising computer operating said plurality of cutters.

48. The method of claim 43 additionally comprising computer operating said plurality of hot wire cutter.

49. A method for producing a plurality of polymeric foamed material structures having slots for receiving stud members comprising the steps of:

(a) cutting a polymeric foamed material with a plurality of cutters in a first direction until each of said cutters has moved a respective first distance in the polymeric foamed material;

(b) cutting subsequently with the plurality of cutters in a second direction the polymeric foamed material of step (a) until each of said cutters has moved a respective second distance in the polymeric foamed material of step (a);

(c) cutting subsequently with the plurality of cutters in said first direction the polymeric foamed material of step (b) until each of said cutters has moved a respective third distance in the polymeric foamed material of step (b);

(d) cutting subsequently with the plurality of cutters in a third direction the polymeric foamed material of step (c) until each of said cutters has moved a respective fourth distance in the polymeric foamed material of step (c);

(e) cutting subsequently with the plurality of cutters in said first direction the polymeric foamed material of step (d) until each of said cutters has moved a respective fifth distance in the polymeric foamed material of step (d);

(f) cutting subsequently with the plurality of cutters in said second direction the polymeric foamed material of step (e) until each of said cutters has moved a respective sixth distance in the polymeric foamed material of step (e);

(g) cutting subsequently with the plurality of cutters in a fourth direction the polymeric foamed material of step (f) until each of said cutters has moved

a respective seventh distance in the polymeric foamed material of step (f);

(h) cutting subsequently with the plurality of cutters in said third direction the polymeric foamed material of step (g) until each of said cutters has moved a respective eighth distance in the polymeric foamed material of step (g);

(i) cutting subsequently with the plurality of cutters in said fourth direction the polymeric foamed material of step (h) until each of said cutters has moved a respective ninth distance in the polymeric foamed material of step (h);

(j) cutting subsequently with the plurality of cutters in said second direction the polymeric foamed material of step (i) until each of said cutters has moved a respective tenth distance in the polymeric foamed material of step (i);

(k) cutting subsequently with the plurality of cutters in said first direction the polymeric foamed material of step (j) until each of said cutters has moved a respective eleventh distance in the polymeric foamed material of step (j);

(l) cutting subsequently with the plurality of cutters in said third direction the polymeric foamed material of step (k) until each of said cutters has moved a respective twelfth distance in the polymeric foamed material of step (k); and

(m) cutting, after said cutting step (l), in said first direction the polymeric foamed material of step (l) with the plurality of cutters to produce a plurality of polymeric foamed material structures having a plurality of slots.

50. The method of claim 49 wherein said respective third distance and said respective eighth distance are approximately equal.

51. The method of claim 49 wherein said respective fifth distance and said respective seventh distance are approximately equal.

52. The method of claim 49 wherein said respective fourth distance is generally less than said respective second distance.

53. The method of claim 49 wherein said respective eighth distance is generally less than said respective tenth distance.

54. The method of claim 49 wherein said third direction is generally opposite to said second direction.

55. The method of claim 49 wherein said fourth direction is generally opposite to said first direction.

56. The method of claim 50 wherein said plurality of cutters are hot wire cutters, each of said hot wire cutters include a wire diameter with a generally known diameter measurement which generally equals said respective third distance and said respective eighth distance.

57. The method of claim 56 additionally comprising computer operating said plurality of hot wire cutters.

58. The method of claim 49 wherein said plurality of cutters generally move in unison.

59. The method of claim 57 wherein said plurality of hot wire cutters generally move in unison.

60. A method for producing a plurality of polymeric foamed material structures comprising the steps of:

(a) cutting a polymeric foamed material with a plurality of cutters until each cutter reaches a respective first cut point;

(b) cutting subsequently with each cutter from the respective first cut point a respective path in the polymeric foamed material of step (a) until each cutter reaches a respective second cut point;

(c) moving each of said plurality of cutters from said respective second cut point to a respective off-set position in the polymeric foamed material of step (b);

(d) retracing generally with each cutter said respective path of each cutter, while each cutter remains in said respective off-set position of step (c) such that a respective slot is formed by each cutter in the polymeric foamed material of step (c); and

(e) cutting the polymeric foamed material of step (d) with the plurality of cutters until the cutters have cut through the polymeric foamed material of step (d), producing a plurality of polymeric foamed material structures having slots.

61. The method of claim 60 additionally comprising cutting with said plurality of cutters track chases in the polymeric foamed material structures of step (e) such that each of said plurality of polymeric foamed material structures additionally includes a track chase.

62. The method of claim 60 wherein said plurality of cutters is a plurality of hot wire cutters.

63. The method of claim 61 wherein said plurality of cutters is a plurality of hot wire cutters.

64. The method of claim 62 additionally comprising computer operating said hot wire cutters.

65. The method of claim 63 additionally comprising computer operating said hot wire cutters.

66. The method of claim 60 wherein said plurality of cutters is a plurality of laser cutters.

67. A method for producing a plurality of polymeric foamed material structures having brace-receiving slots comprising the steps of:

(a) providing a block of polymeric foamed material; and

(b) moving a plurality of cutters through the block of polymeric foamed material in a first direction of travel, while interrupting at least one time the moving of the plurality of cutters in said first direction of travel to move the cutters through the block of polymeric foamed material in at least one direction of travel which differs from said first direction of travel, such that each cutter produces a respective brace-receiving slot in the polymeric foamed material, until said plurality of cutters have moved completely through the block of polymeric foamed material to produce a plurality of polymeric foamed material structures with each structure having at least one brace-receiving slot.

68. A method for producing a plurality of polymeric foamed material structures having brace-receiving slots comprising the steps of:

(a) providing a block of polymeric foamed material in a generally stationary position;

(b) moving a plurality of cutters through the generally stationary block of polymeric foamed material of step (a) in a first direction of travel;

(c) interrupting the movement of the plurality of cutters from said first direction of travel through the generally stationary blocks of polymeric foamed material to move the cutters in at least one direction of travel which differs from said first direction of travel such that each cutter produces a respective brace-receiving slot in the polymeric foamed material; and

(d) continuing said moving step (b) of said plurality of cutters in said first direction of travel, while intermittently interrupting the movement of the plurality of cutters from said first direction of travel to move the cutters in at least one direction of travel which differs from said first direction of travel such that each cutter produces at least one additional respective brace-receiving slot in the polymeric foamed material, until said plurality of cutters have moved completely through the generally stationary block of polymeric foamed material after which a plurality of polymeric foamed material structures are produced with each polymeric foamed material structure having a plurality of brace-receiving slots.

69. A method for producing a plurality of polymeric foamed material panels comprising the steps of:

(a) cutting a polymeric foamed material in a first direction with a plurality of cutters generally moving in unison;

(b) cutting subsequently the polymeric foamed material of step (a) in a second direction with said plurality of cutters generally moving in unison;

(c) cutting, after said cutting step (b), the polymeric foamed material of step (b) in said first direction with said plurality of cutters generally moving in unison;

(d) cutting, after said cutting step (c), the polymeric foamed material of step (c) in a third direction with said plurality of cutters generally moving in unison wherein said third direction is generally opposite to said second direction;

(e) cutting, after said cutting step (d), the polymeric foamed material of step (d) in said first direction with said plurality of cutters generally moving in unison until said cutters have cut through the polymeric foamed material of step (d) to produce a

plurality of polymeric foamed material structures having brace-receiving configurations; and

(f) sliding brace members into the brace-receiving configurations of said polymeric foamed material structures of step (e) to produce a plurality of polymeric foamed material panels with each polymeric foamed material panel having one of said brace members.

70. A method for producing a polymeric foamed material structure having a slot comprising the steps of:

(a) cutting with a cutter a polymeric foamed material until reaching a preslot cut point;

(b) cutting subsequently a first path in the polymeric foamed material with the cutter from the preslot cut point until reaching a first cut point;

(c) moving the cutter in the polymeric foamed material of step (b) a predetermined distance from the first cut point to a second cut point; and

(d) cutting subsequently from the second cut point a second path in the polymeric foamed material of step (c) with the cutter until the cutter reaches a postslot cut point to produce a polymeric foamed material structure having a slot.

71. The method of claim 70 wherein said slot of step (d) has a width equal to about twice said predetermined distance of step (c).

72. The method of claim 70 wherein said cutter is a hot wire cutter having a wire diameter with a generally known diameter measurement, and said slot of step (d) has a width equal to about twice the generally known diameter measurement of the wire diameter.

73. The method of claim 72 additionally comprising computer operating said hot wire cutter.

74. The method of claim 70 additionally comprising sliding a stud member into said slot of step (d).

75. The method of claim 73 additionally comprising sliding a stud member into said slot of step (d).

76. A method for producing at least one polymeric foamed material structure having at least one slot comprising the steps of:

(a) providing at least one cutter;

(b) cutting with the cutter of step (a) a polymeric foamed material until the cutter reaches at least one respective preslot cut point;

(c) cutting subsequently with cutter from the respective preslot cut point of step (b) at least one respective path in the polymeric foamed material of step (b) until the cutter reaches at least one first cut point;

(d) forming with the cutter in the polymeric foamed material of step (c) at least one respective off-set path communicating with the respective path of step (c) to form at least one slot within the polymeric foamed material of step (c); and

(e) cutting subsequently the polymeric foamed material of step (d) with the cutter until the cutter has cut through the polymeric foamed material of step (d), producing at least one polymeric foamed structure having at least one slot.

77. The method of claim 76 wherein said at least one respective path has at least one respective path length, and said at least one respective off-set path communicates with the at least one respective path along the at least one respective path length of the at least one respective path, such that the at least one respective path and the least one respective off-set path together form the at least one slot within the polymeric foamed material of step (c).

78. The method of claim 76 wherein said at least one cutter comprises a plurality of hot wire cutters cutting a plurality of respective paths in the polymeric foamed material of step (b) and forming a plurality of respective off-set paths in the polymeric foamed material of step (c), such that the plurality of respective paths and the plurality of respective off-set paths together form a plurality of respective slots in the polymeric foamed material of step (c), and such that, after said cutting step (e) with the plurality of hot wire cutters, a plurality of polymeric foamed structures are produced having a plurality of slots.

79. The method of claim 78 additionally comprising sliding a plurality of stud members into the plurality of slots.

80. The method of claim 79 additionally comprising computer-operating said plurality of hot wire cutters.

AN IMPROVED SYNTHETIC PANEL AND METHOD

Abstract Of The Disclosure

A method for producing a polymeric foamed material panel including the steps of providing a polymeric foamed material; and cutting (e.g. hot wire cutting) the polymeric foamed material until reaching a preconfiguration cut point. The method further includes cutting subsequently from the preconfiguration cut point a brace-receiving configuration in the polymeric foamed material; and sliding a brace member into the brace-receiving configuration to produce a polymeric foamed material panel. A method for forming a structure comprising engaging together a pair of polymeric foamed material panels produced in accordance with the method for producing a polymeric foamed material panel. A polymeric foamed material panel comprising a panel consisting of a polymeric foamed material, and a brace-receiving-configured slot disposed in the polymeric foamed material of the panel. A brace member is disposed in the brace-receiving-configured slot in the polymeric foamed material of the panel. The brace-receiving-configured slot includes at least one seared wall.

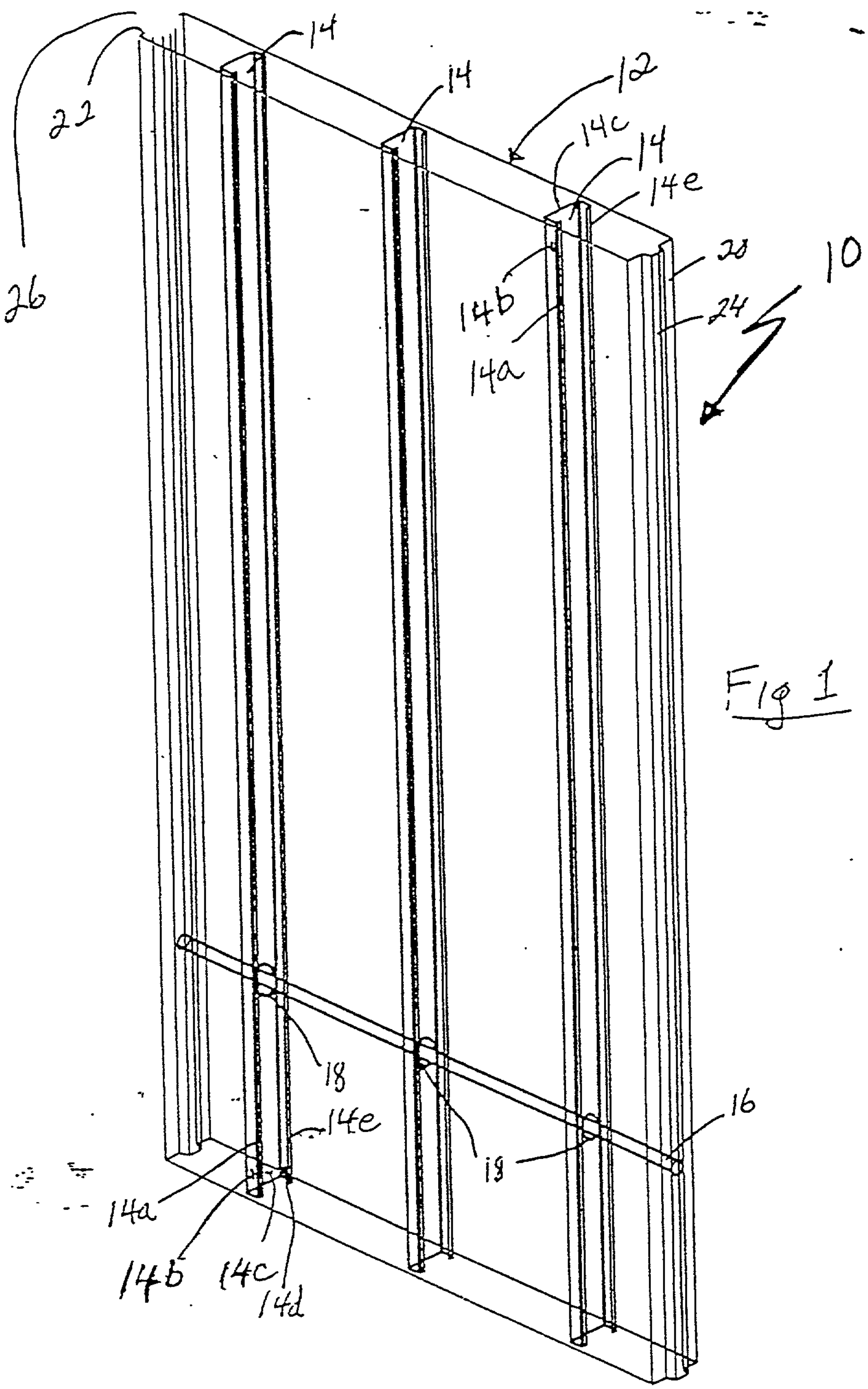

22
26
14
14
12
14c
14
14e
20
24
10
14b
14a
18
19
16
14e
14a
14b
14c
14d

Fig 1

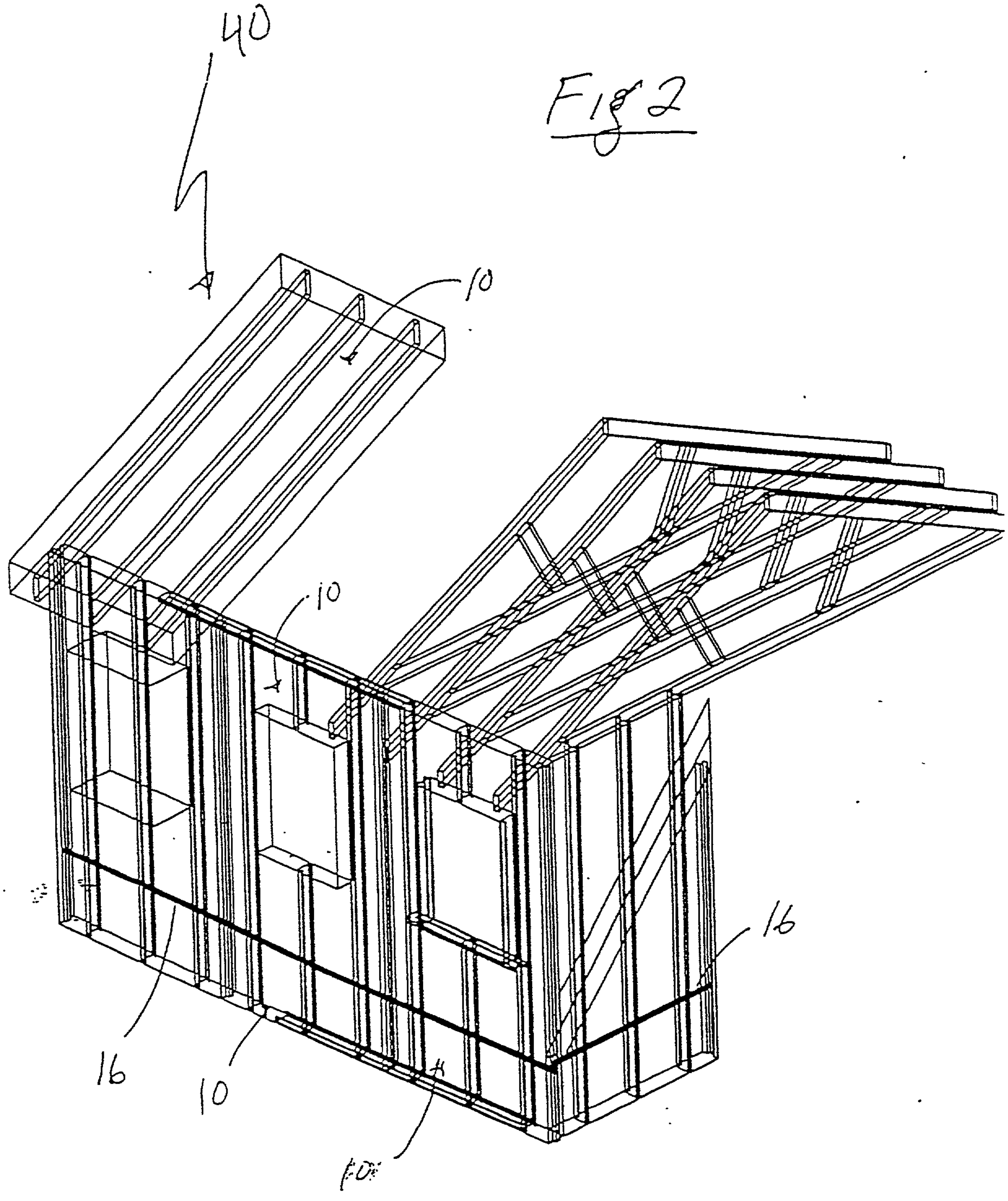
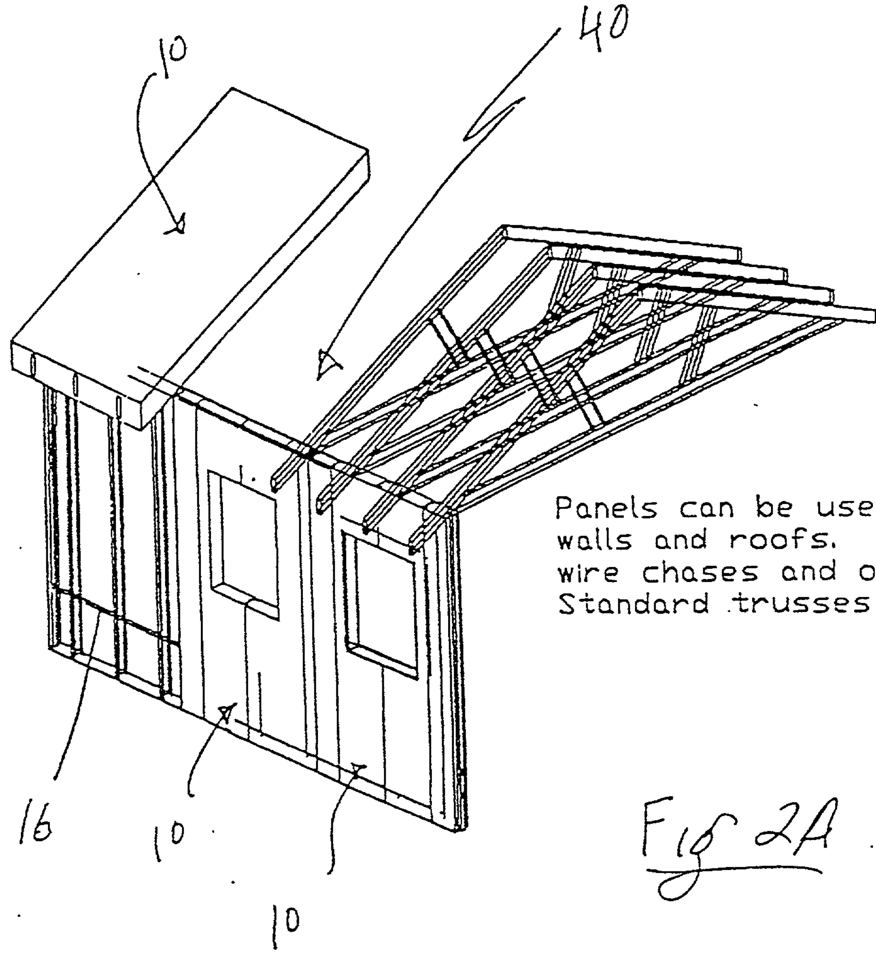


Fig 2



Panels can be used for walls and roofs. Pre-engineered wire chases and opennings. Standard trusses can be used

Fig 2A

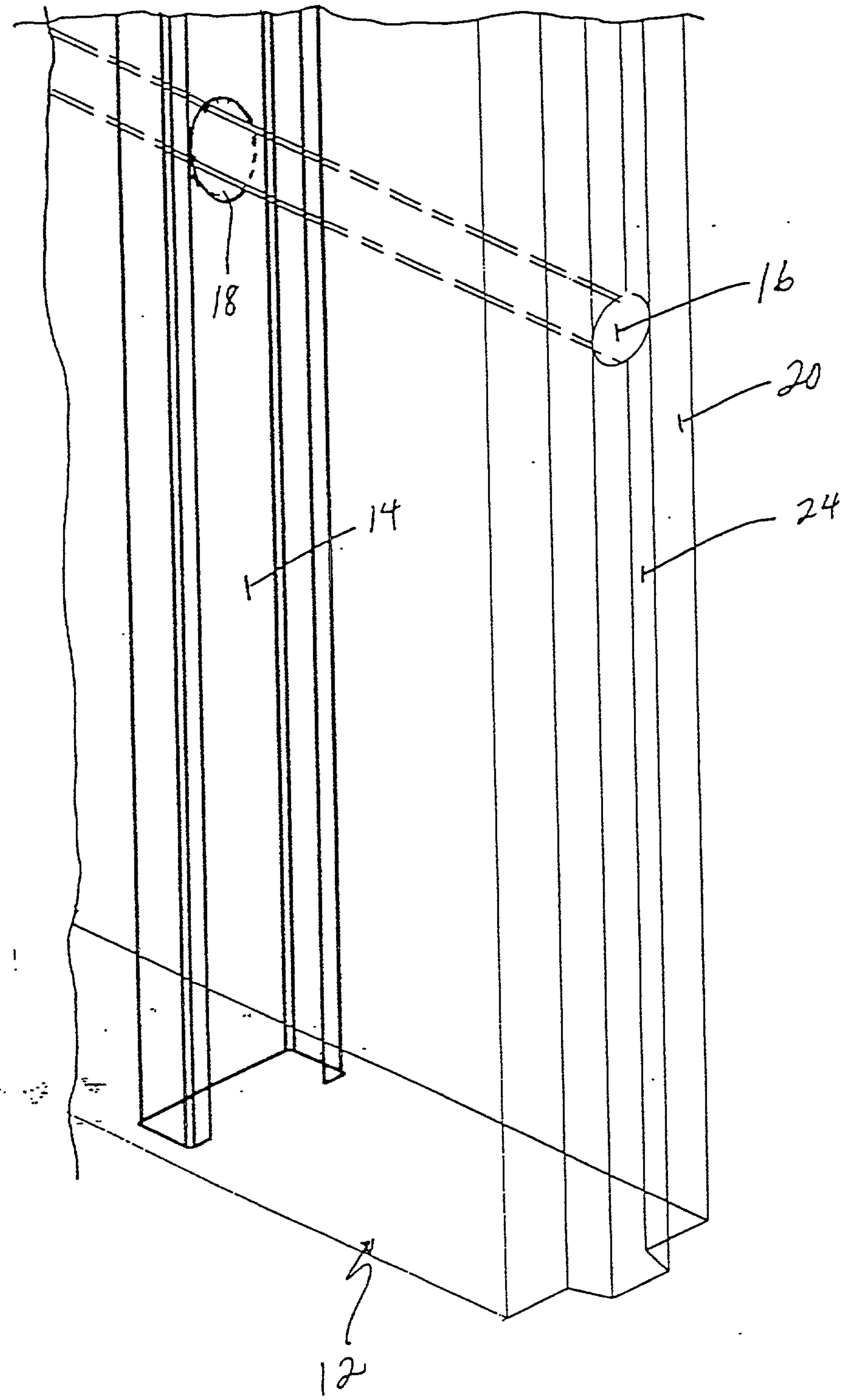


Fig. 3

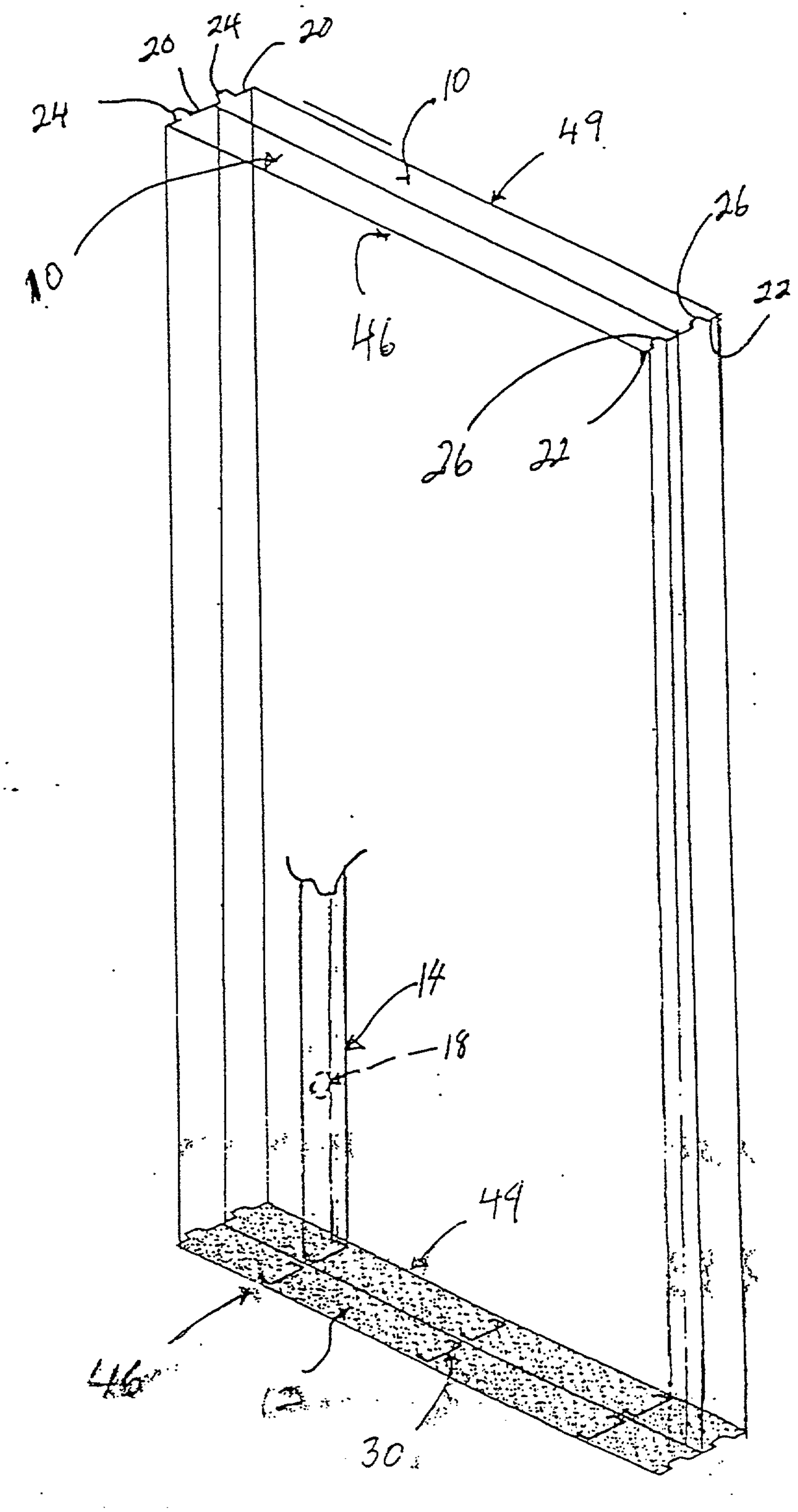


Fig 4

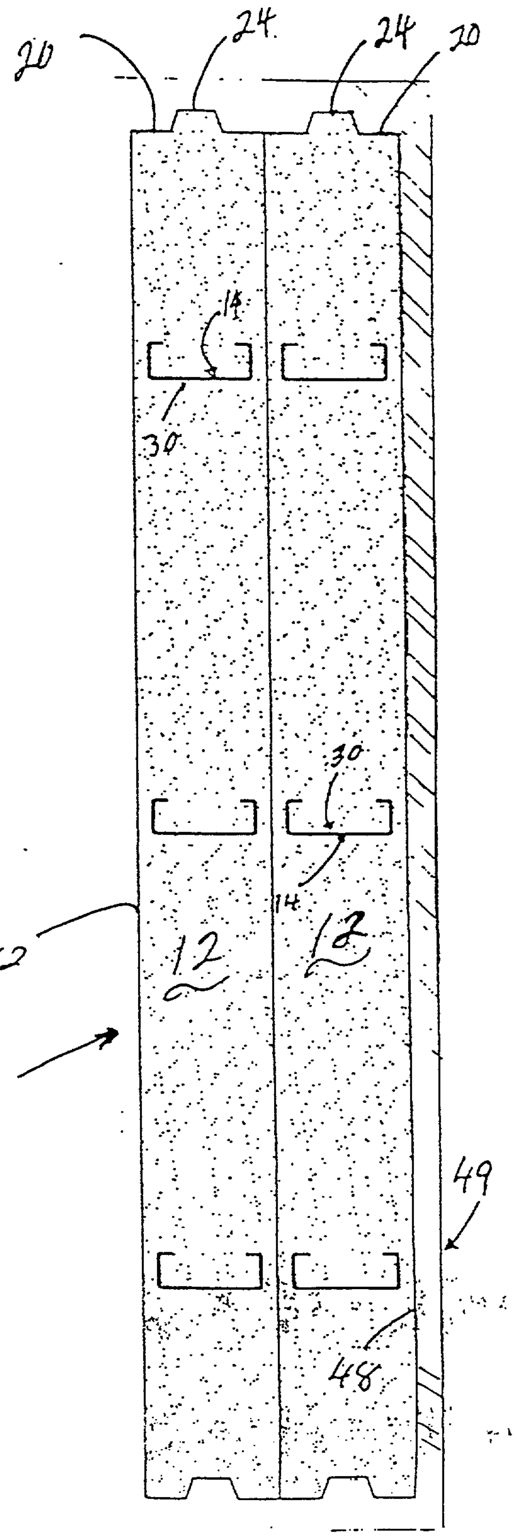


Fig 5

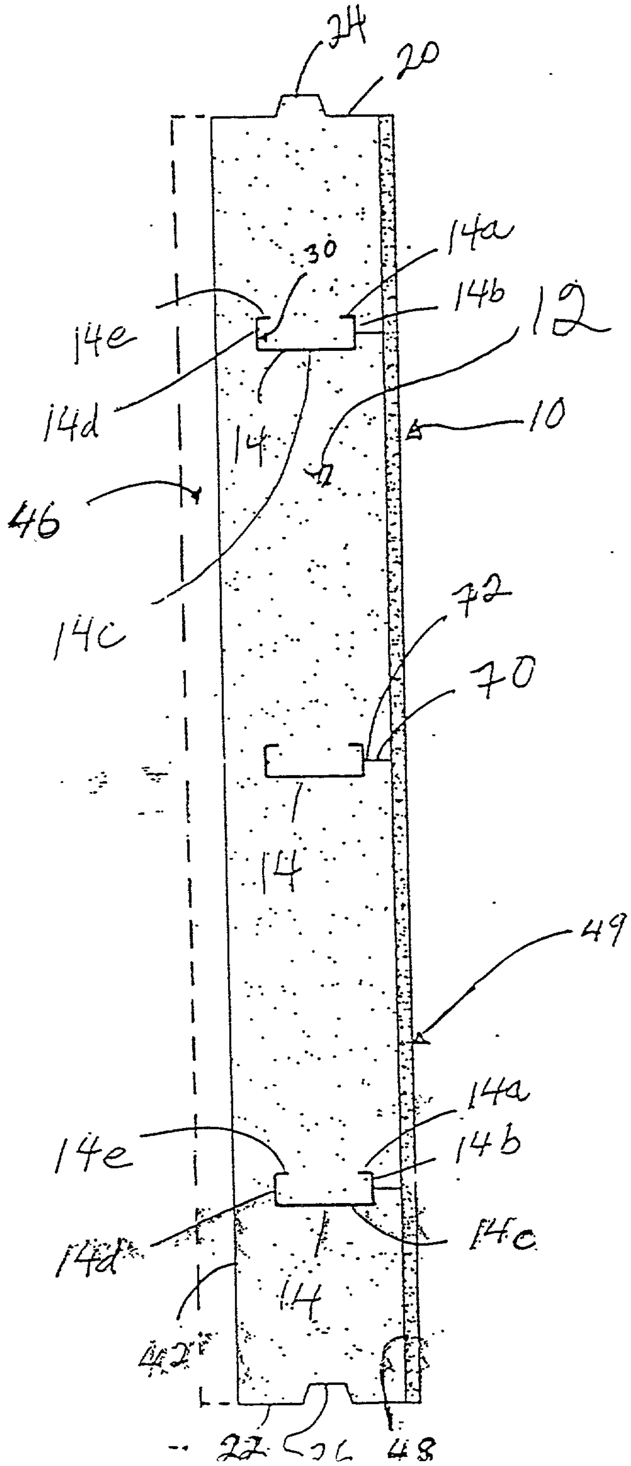


Fig 6

Sheet rock

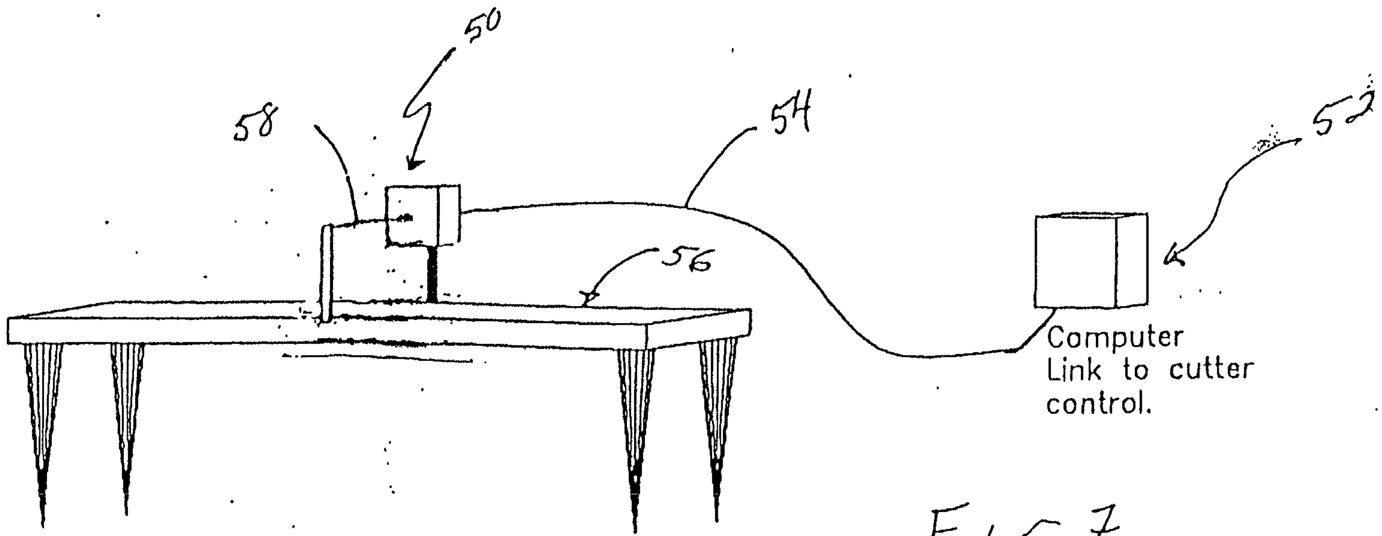


Fig 7

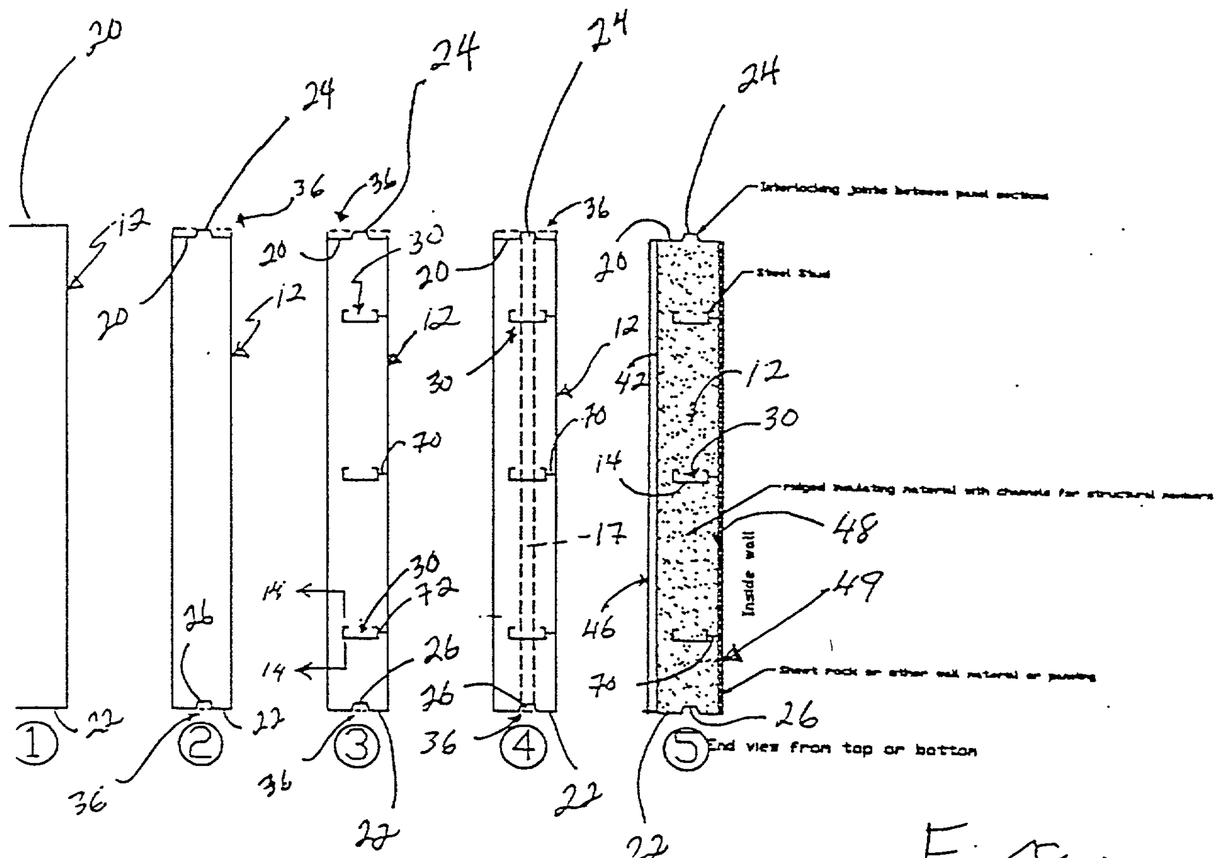


Fig 8

Process steps:

1. Solid block of core material
2. Cut outline shape with computer added design
3. Cut shape of supporting members as required using computer added design
4. Cut electrical chases as required
5. Install or applied inside and outside covering as required

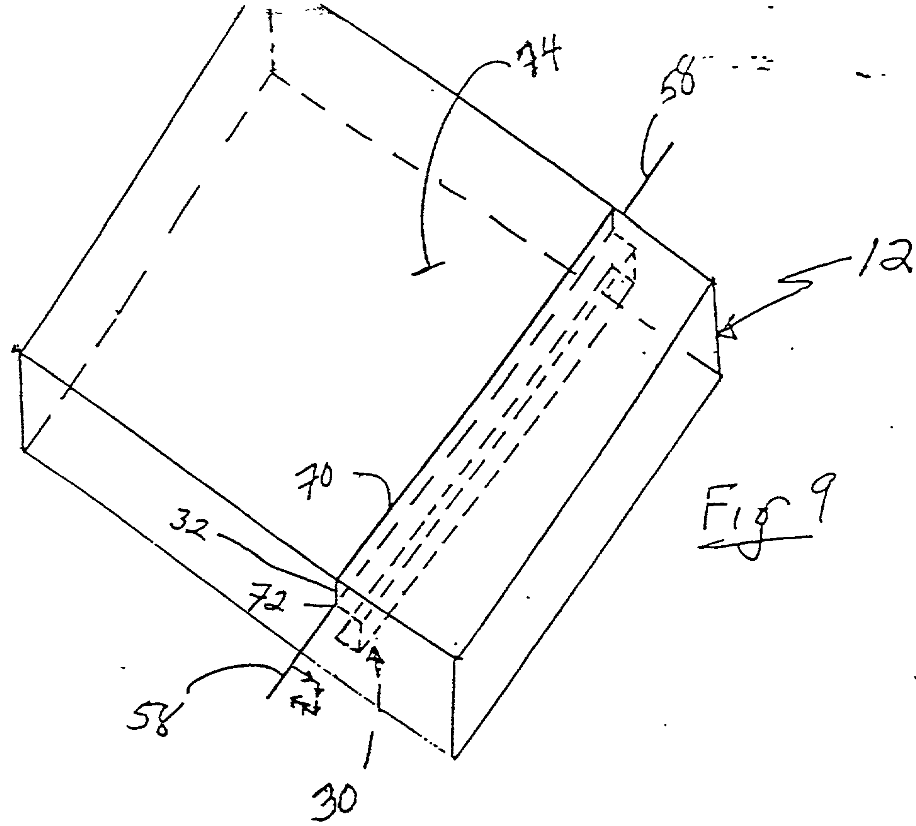


Fig 9

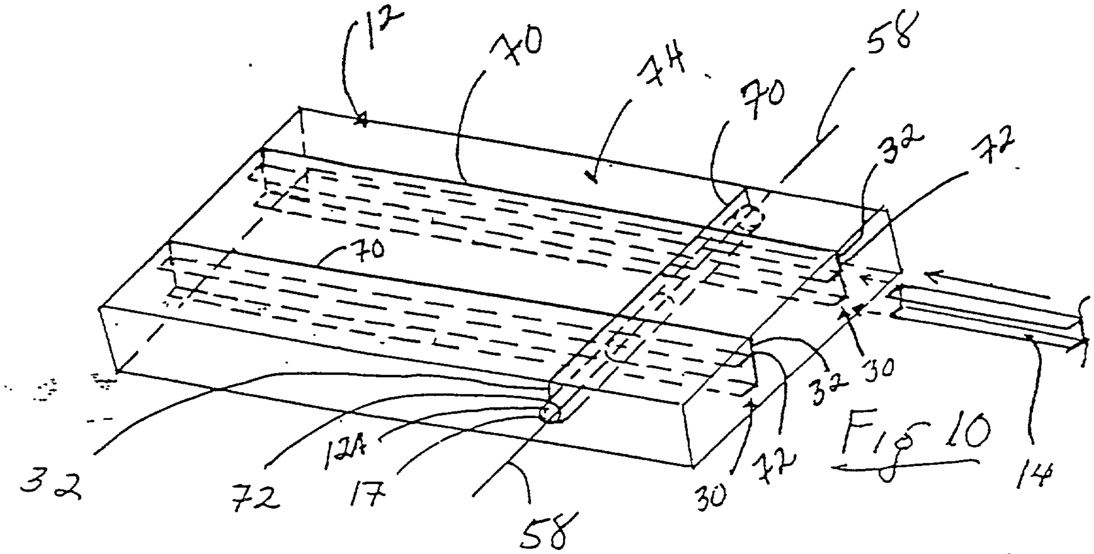


Fig 10

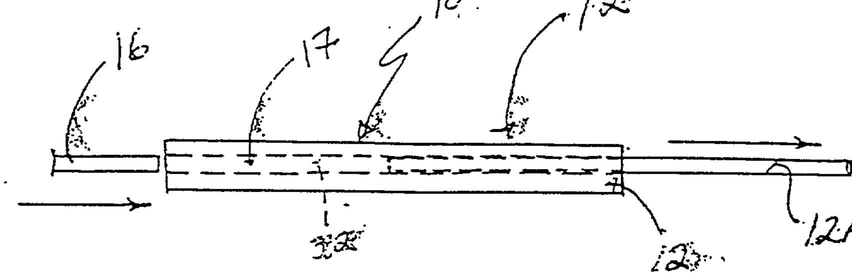


Fig 11

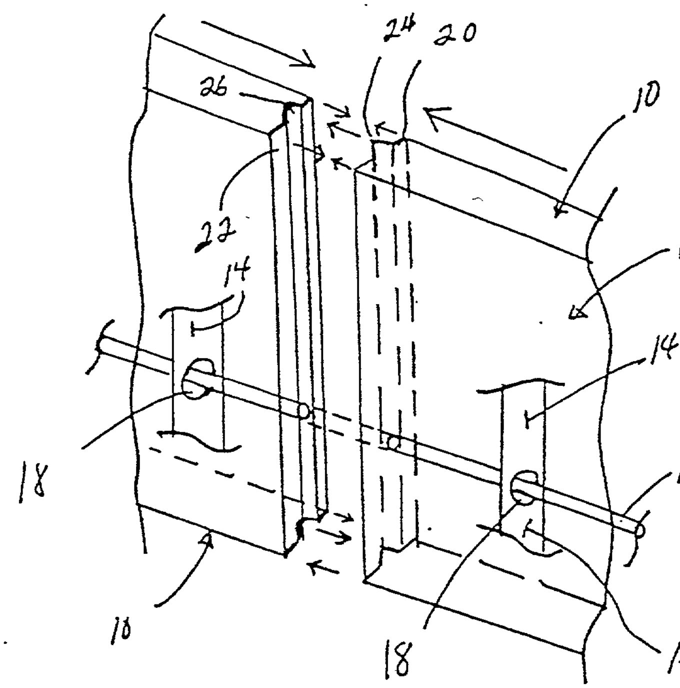


Fig 13

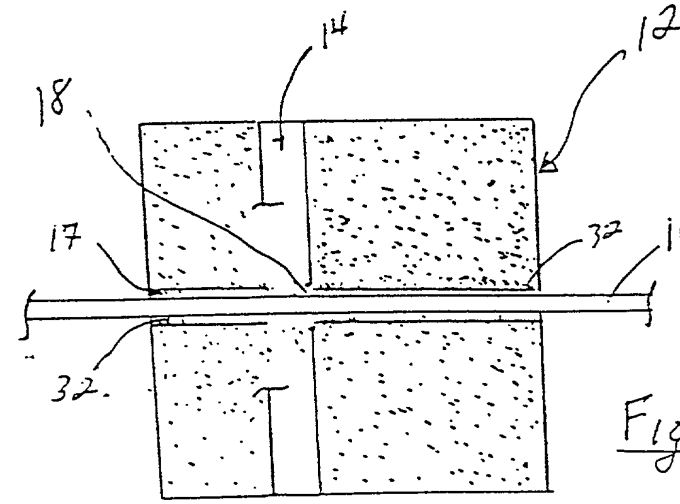


Fig 12

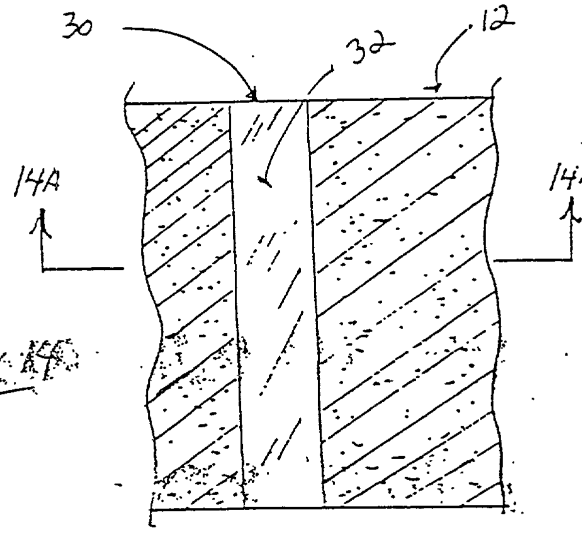


Fig 14

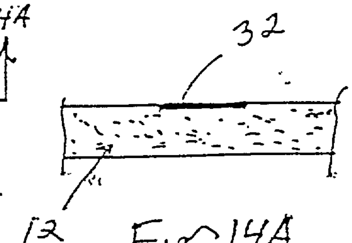


Fig 14A

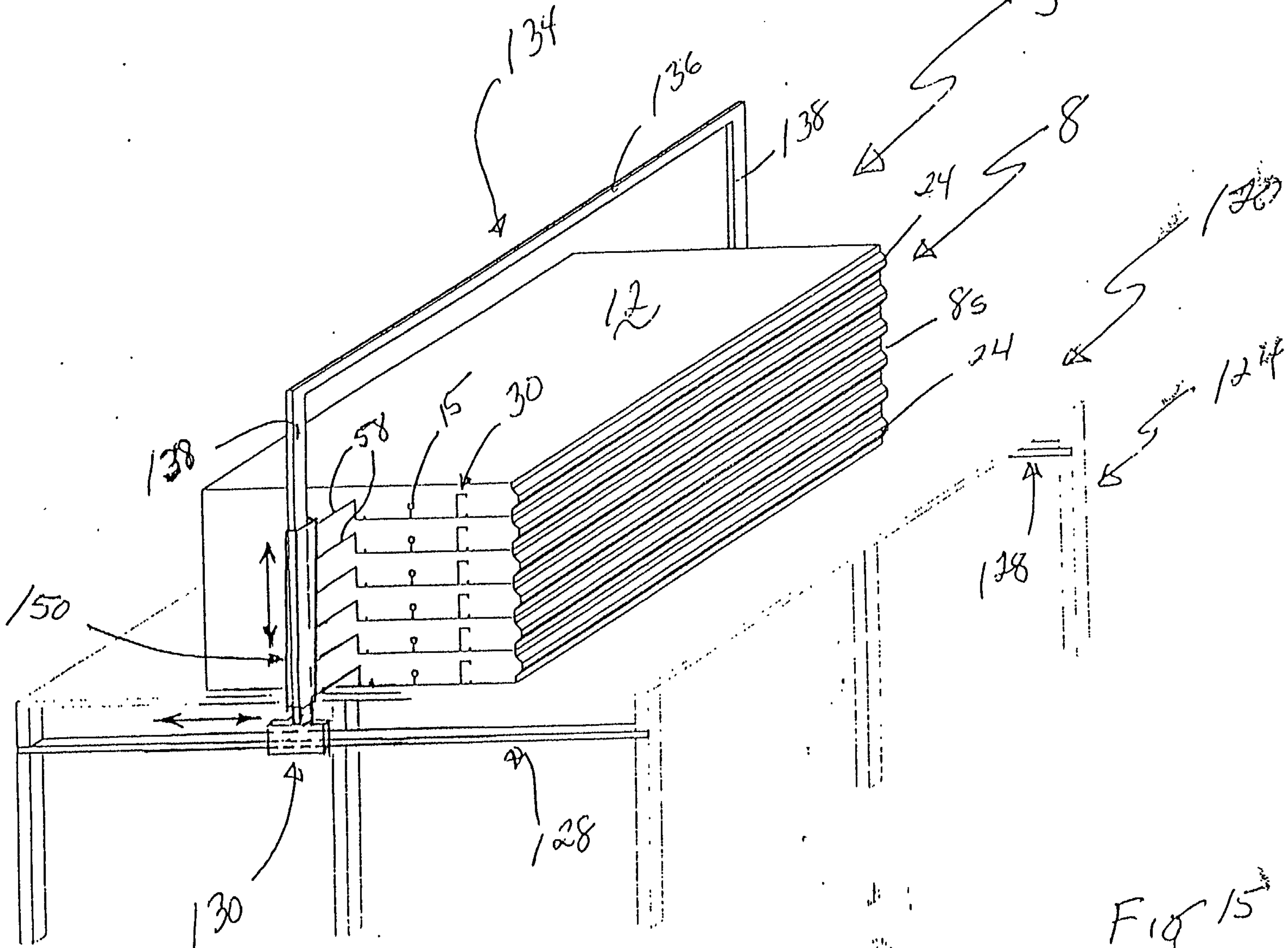
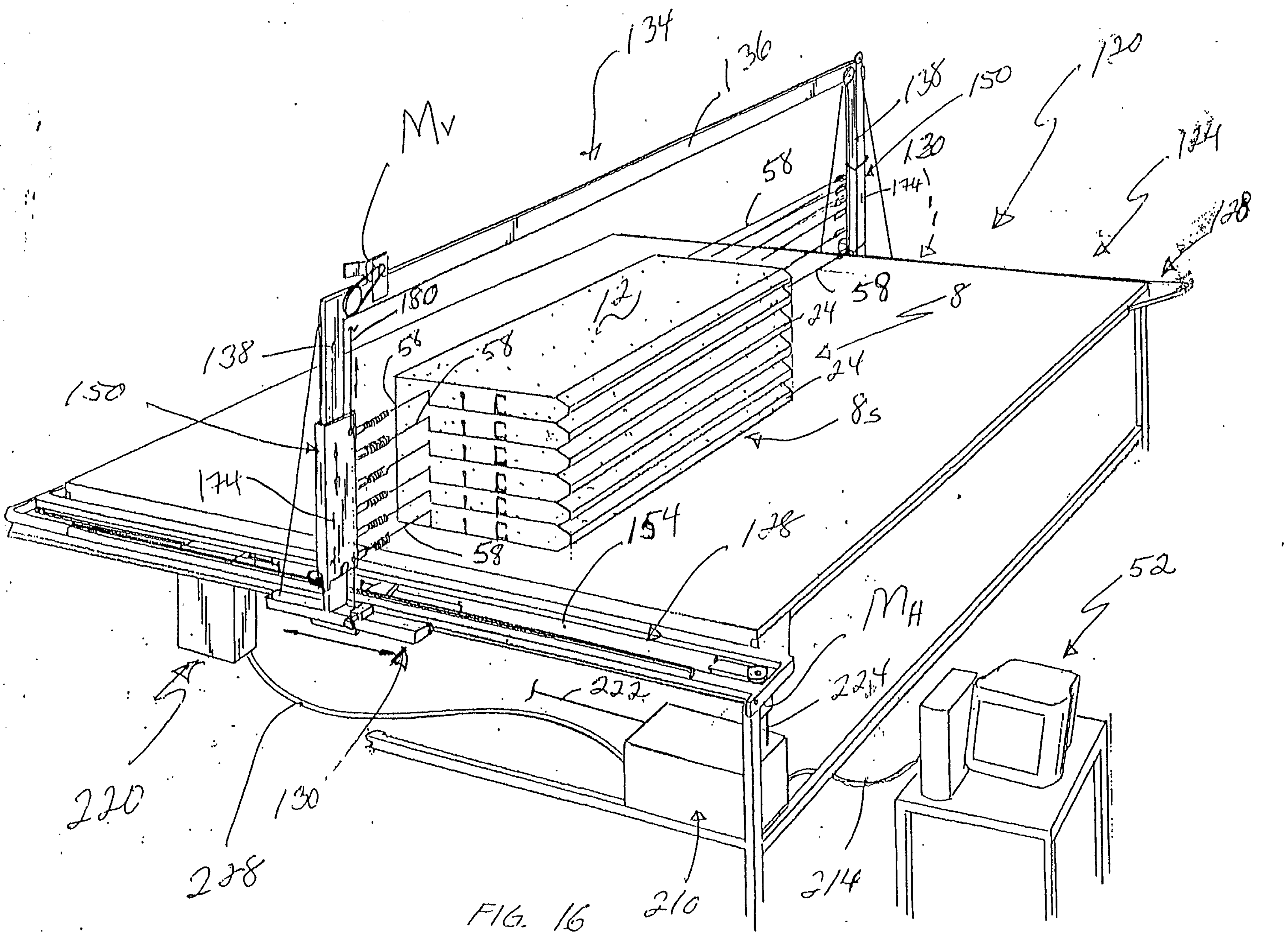


Fig 15


134
136
Mv
180
138
150
58
130
174
120
124
128
12
58
58
8
24
24
8s
174
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154
128
MH
224
222
52
220
228
130
210
214

FIG. 16

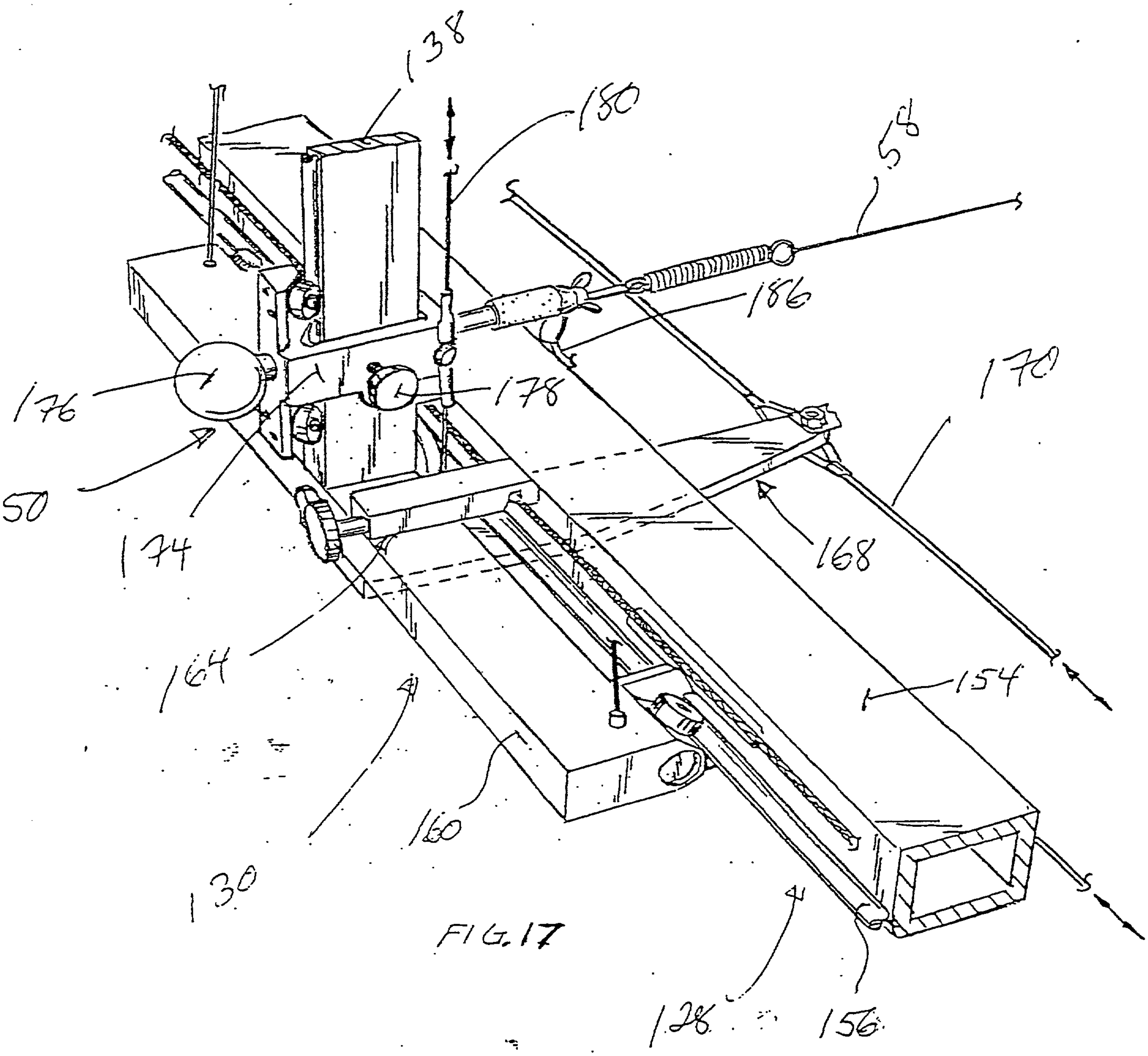
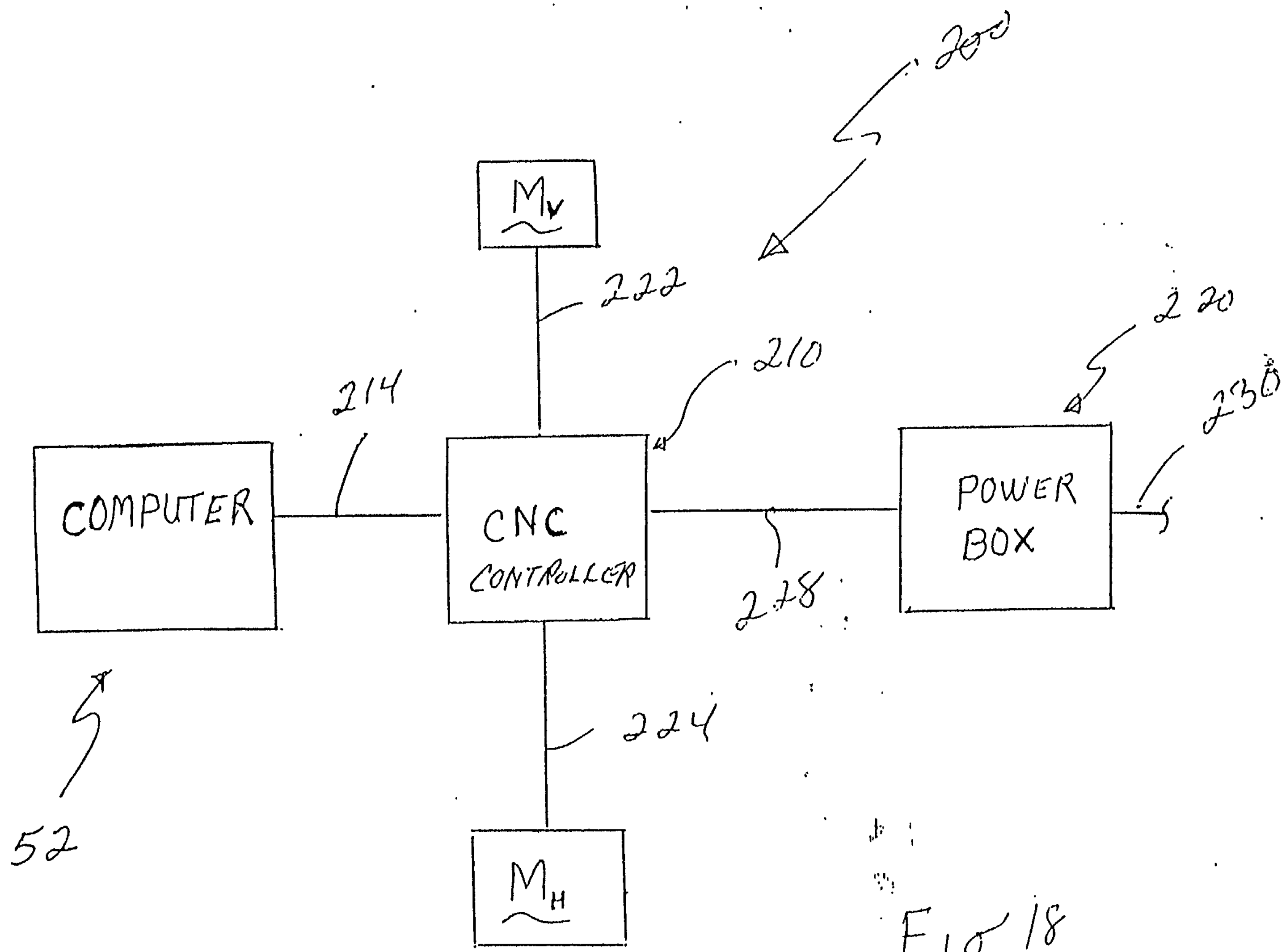


FIG. 17



200
M_V
222
210
220
230
214
COMPUTER
CNC
CONTROLLER
278
POWER
BOX
224
52
M_H

Fig 18

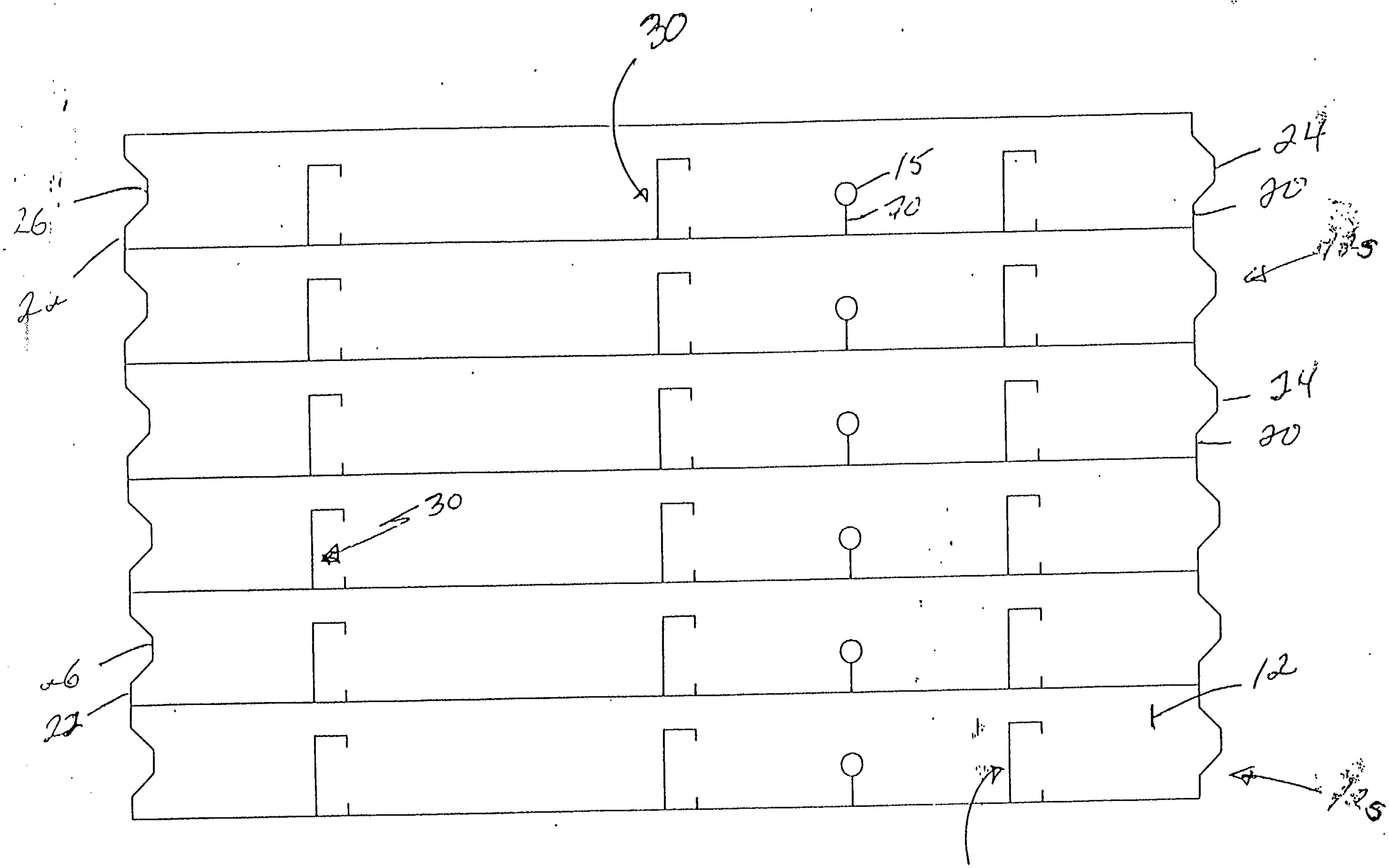


Fig 19

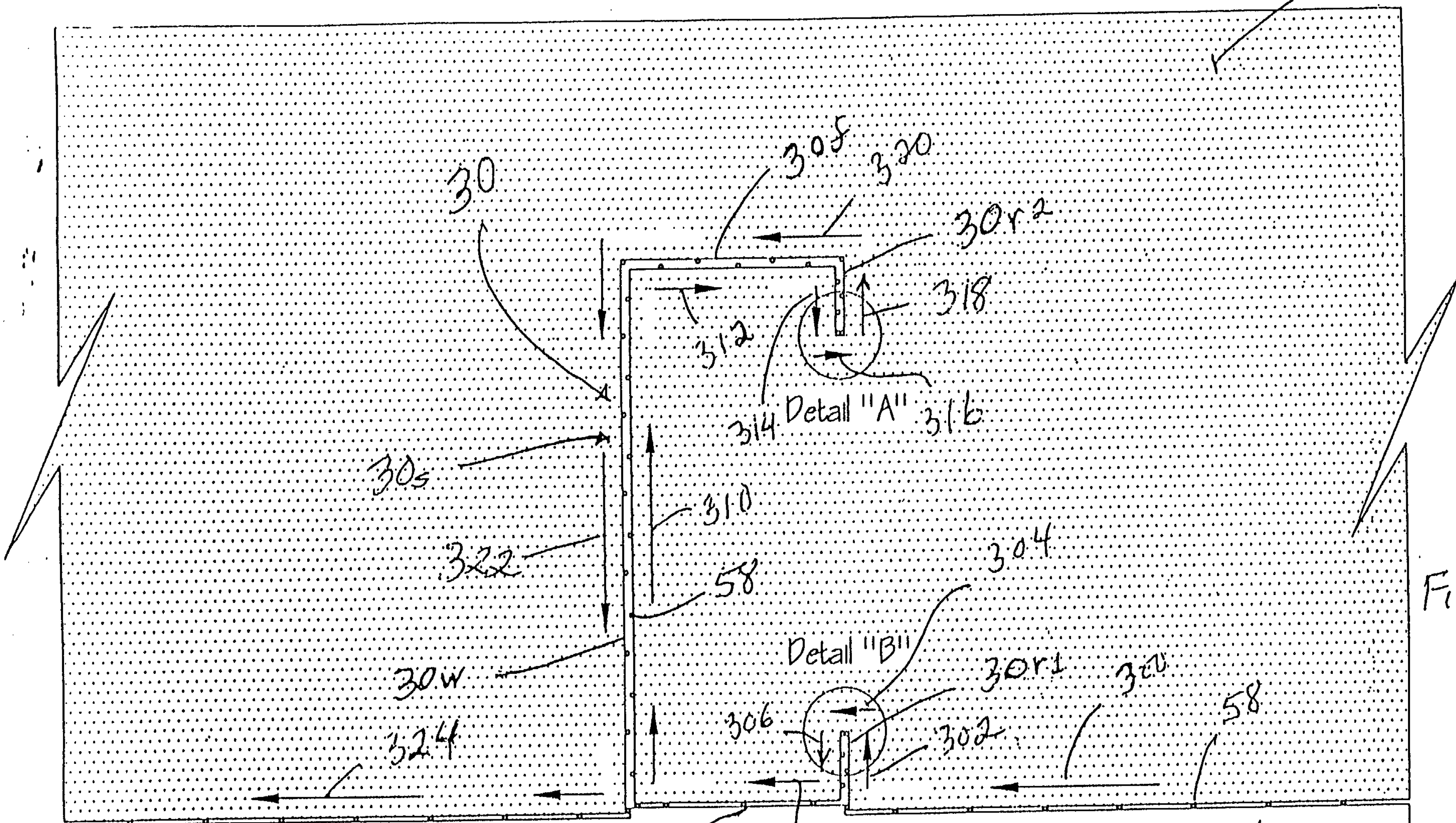


Fig 20

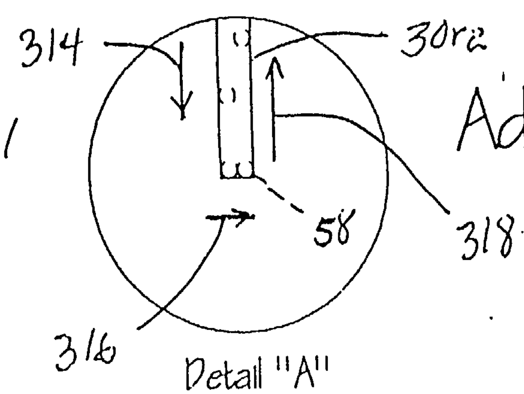


Fig 21

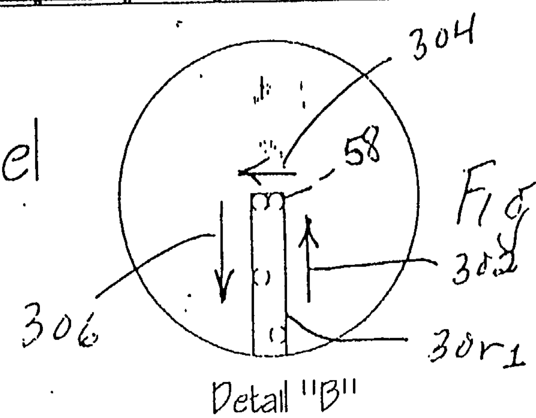
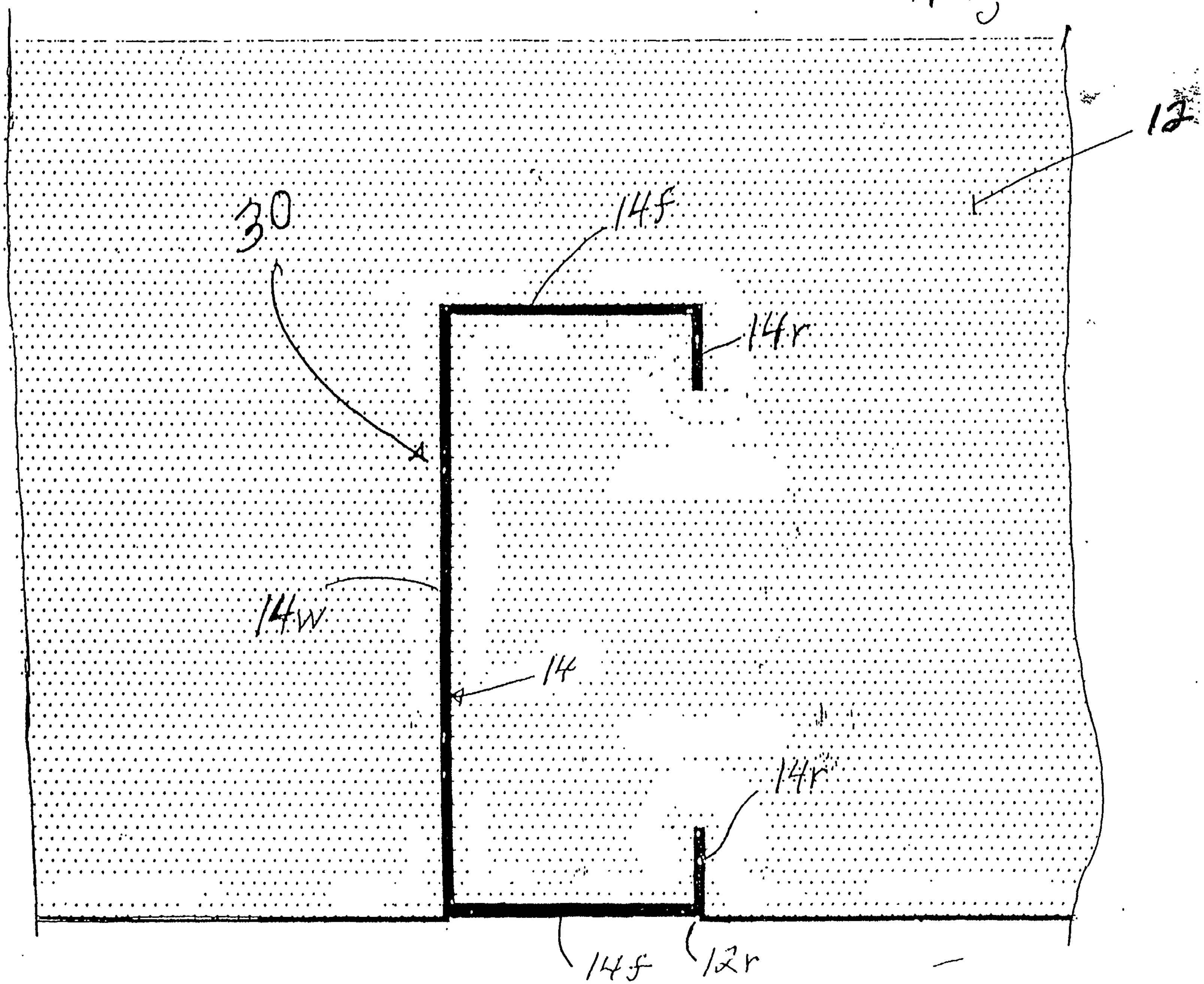
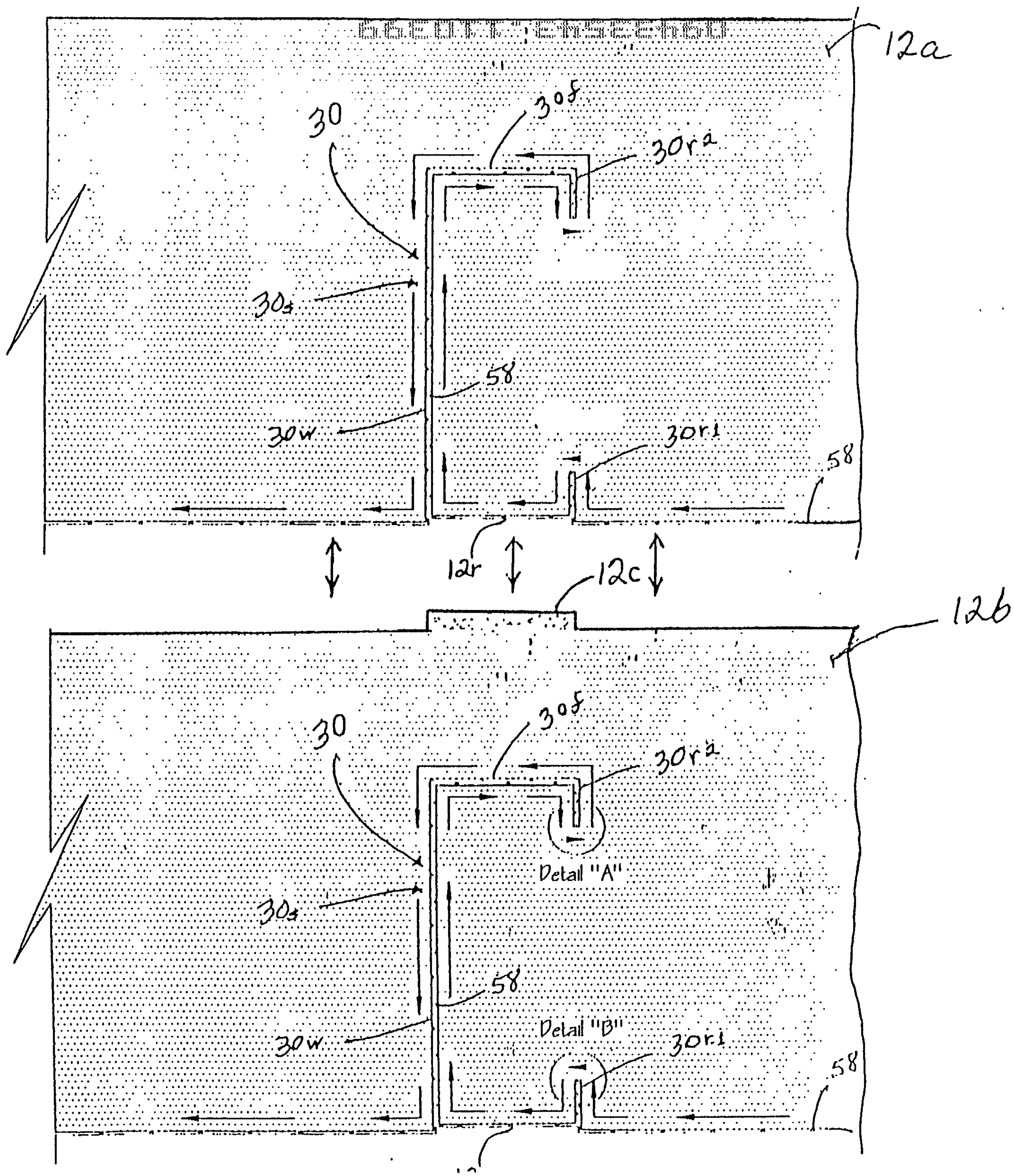


Fig 22

Fig 20A



20B


12a
30
30f
30r2
30s
58
30w
30r1
58
12r
12c
12b
30
30f
30r2
Detail "A"
30s
58
Detail "B"
30w
30r1
58

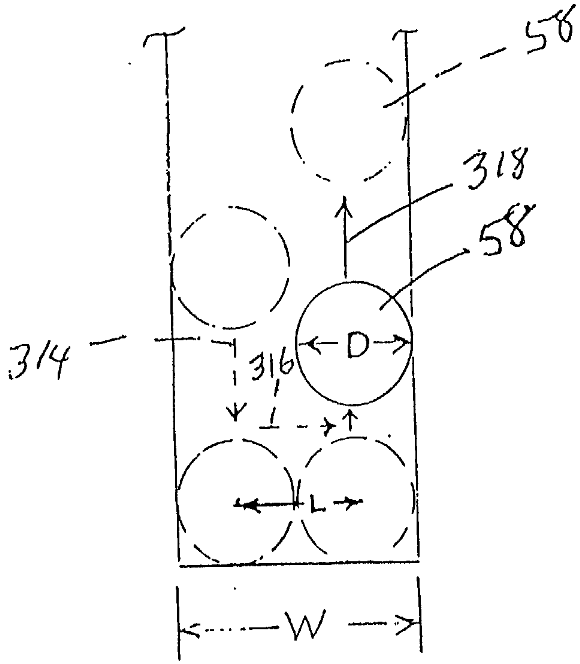


Fig 23

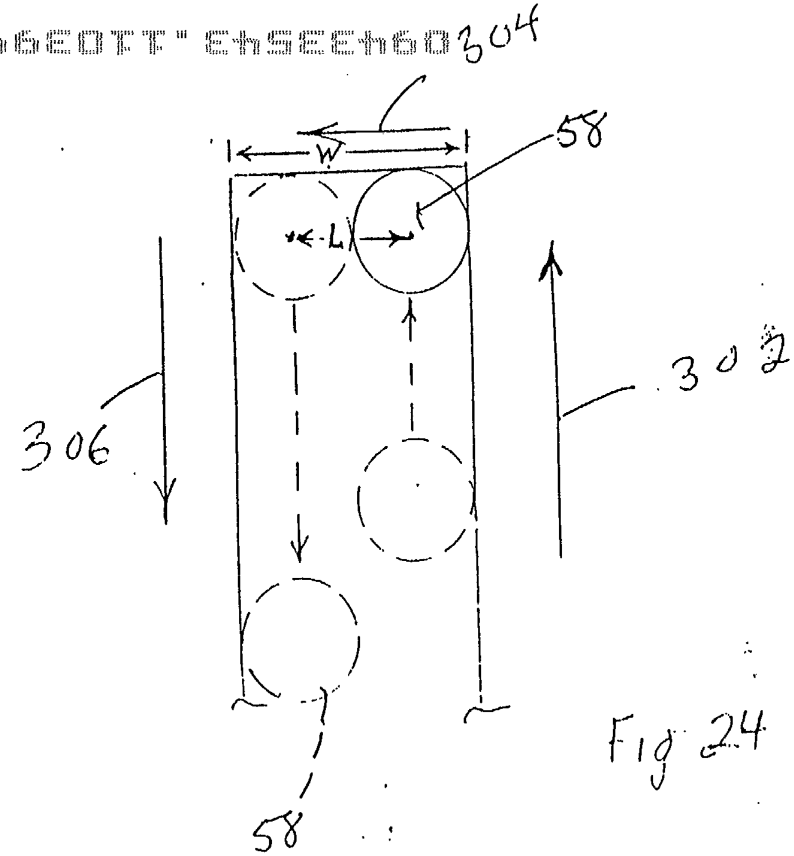


Fig 24

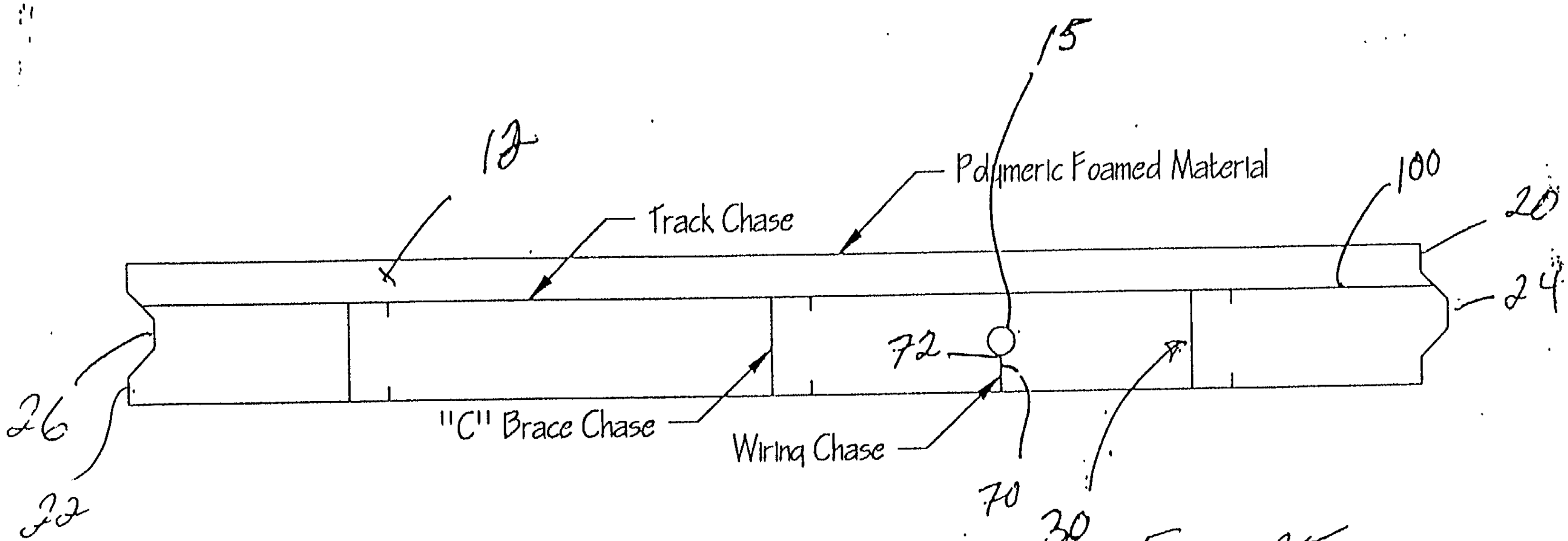

15
12
Polymeric Foamed Material
100
20
Track Chase
24
72
26
"C" Brace Chase
Wiring Chase
22
70
30

Fig 25

Fig 26

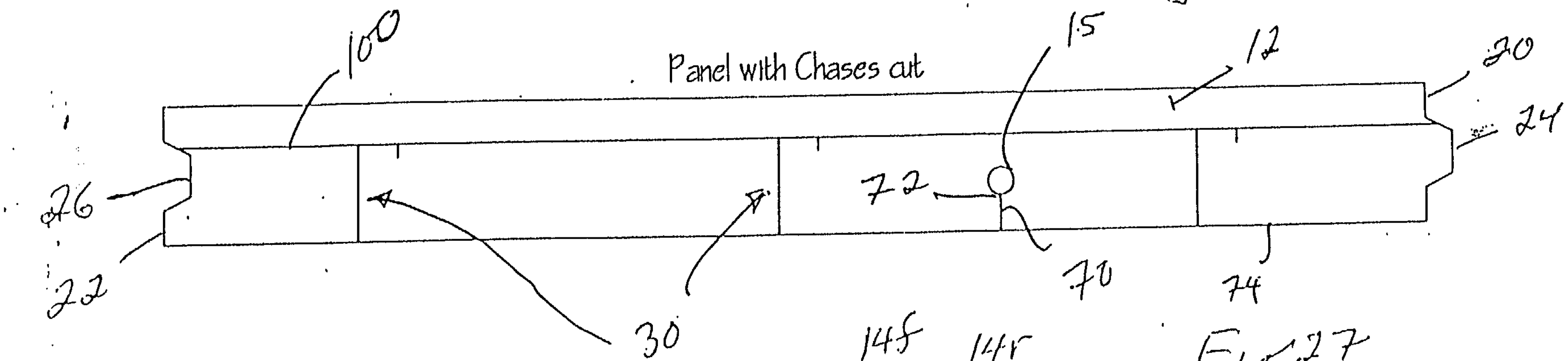


Fig 27

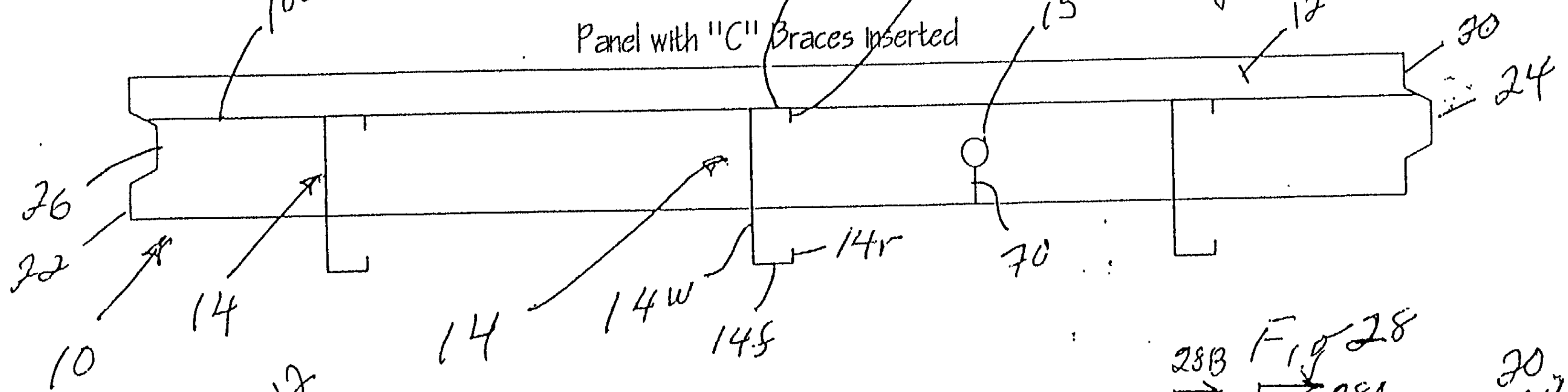
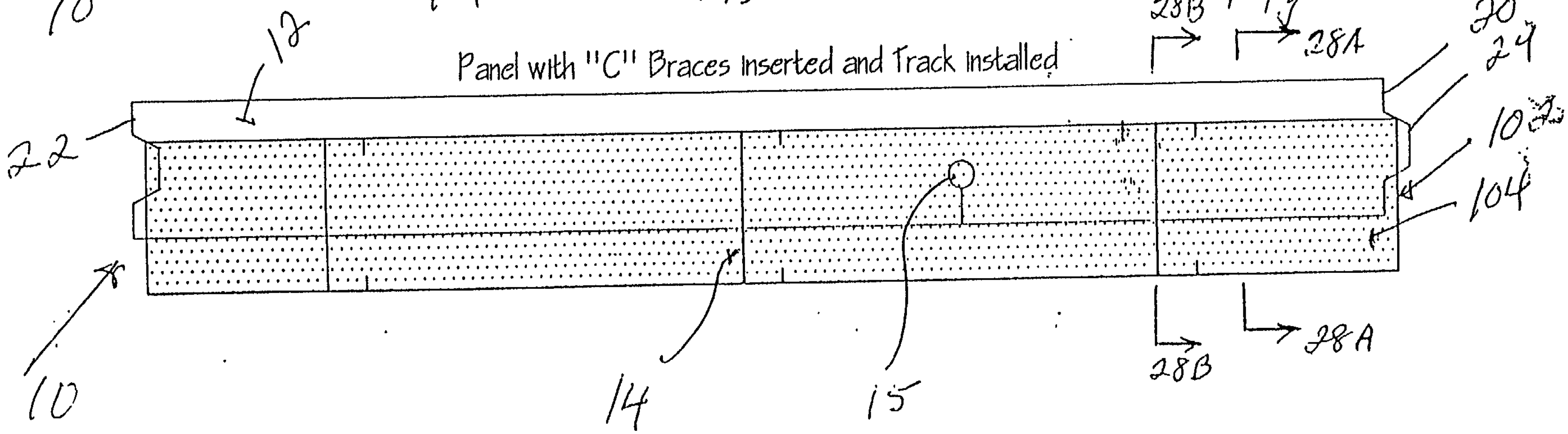


Fig 28



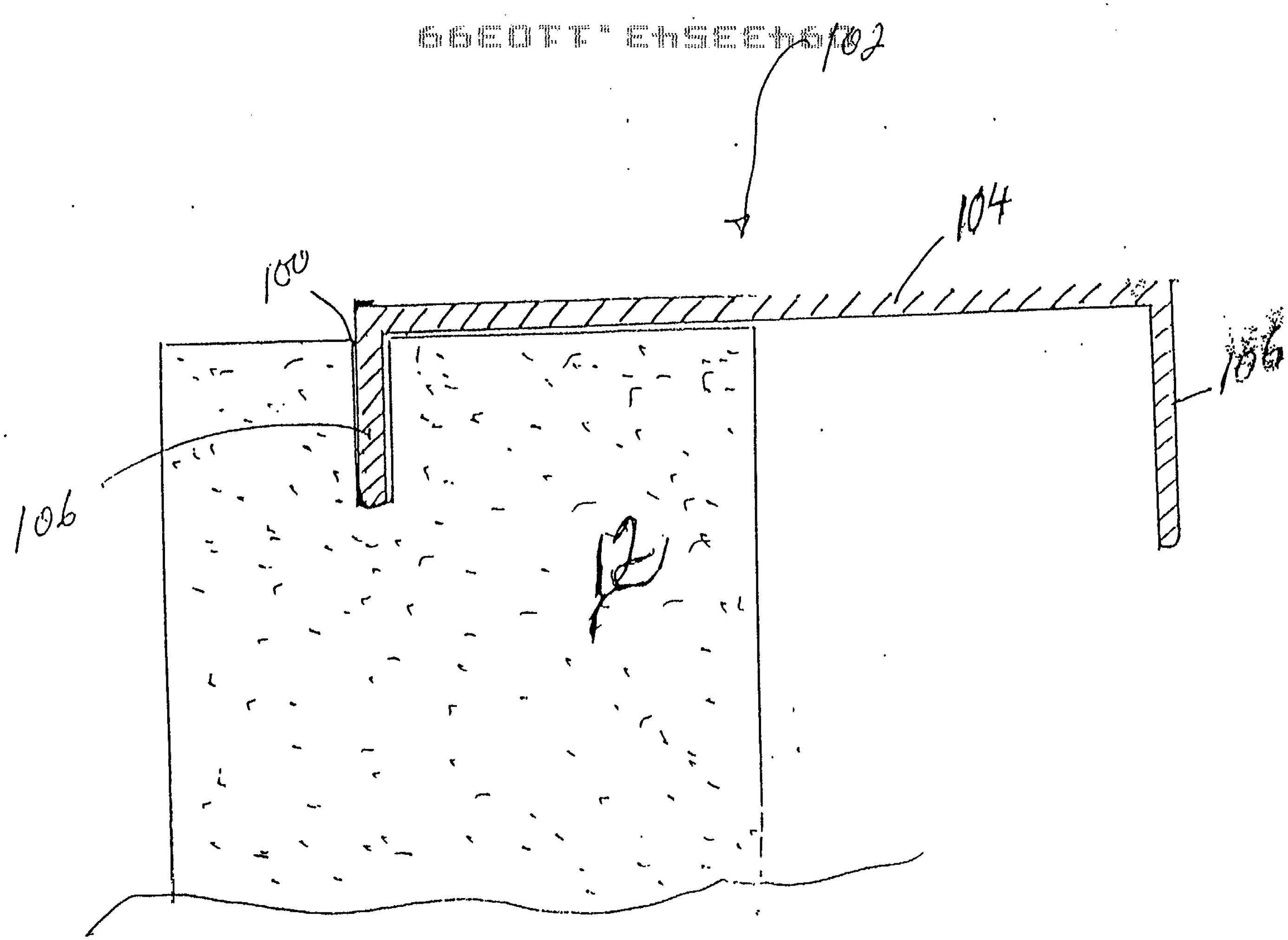


Fig 28A

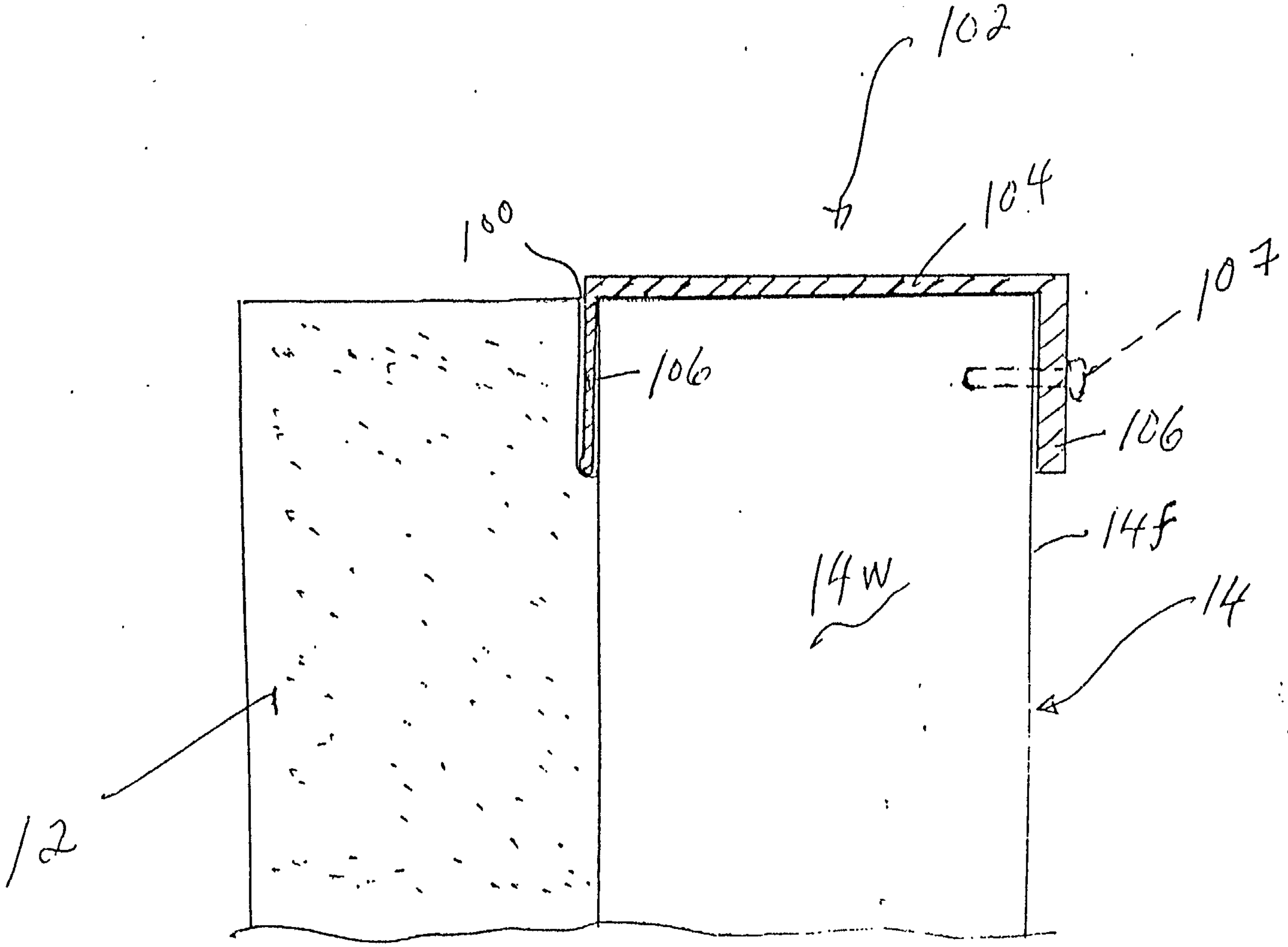


Fig 28B

Fig 29

Panel with Chases cut

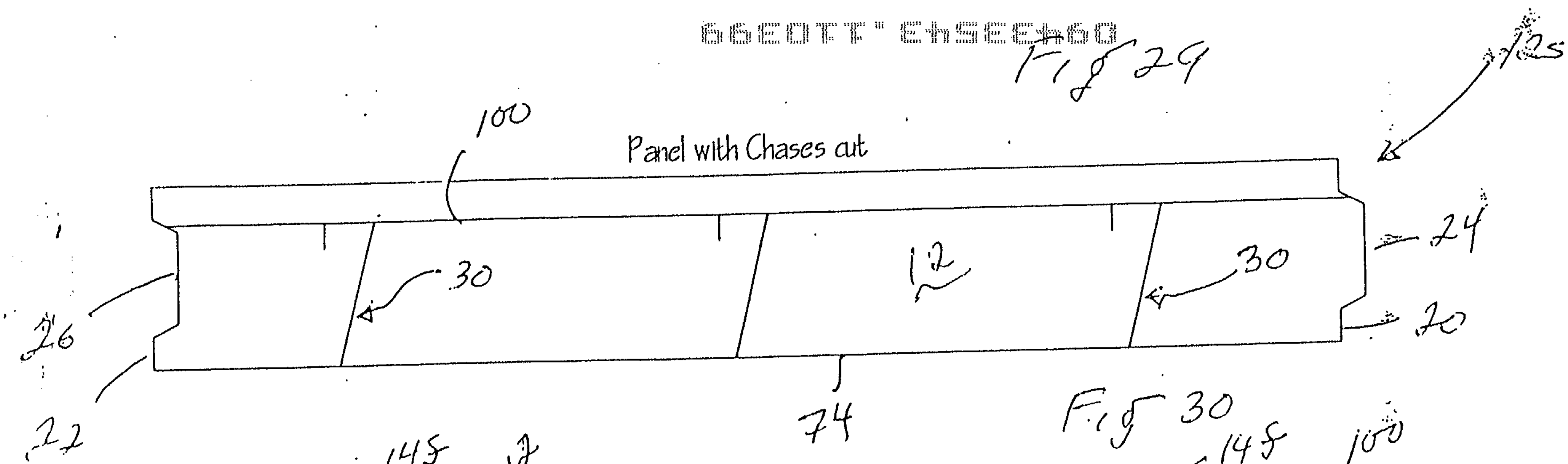


Fig 30

Panel with "Z" Braces Inserted

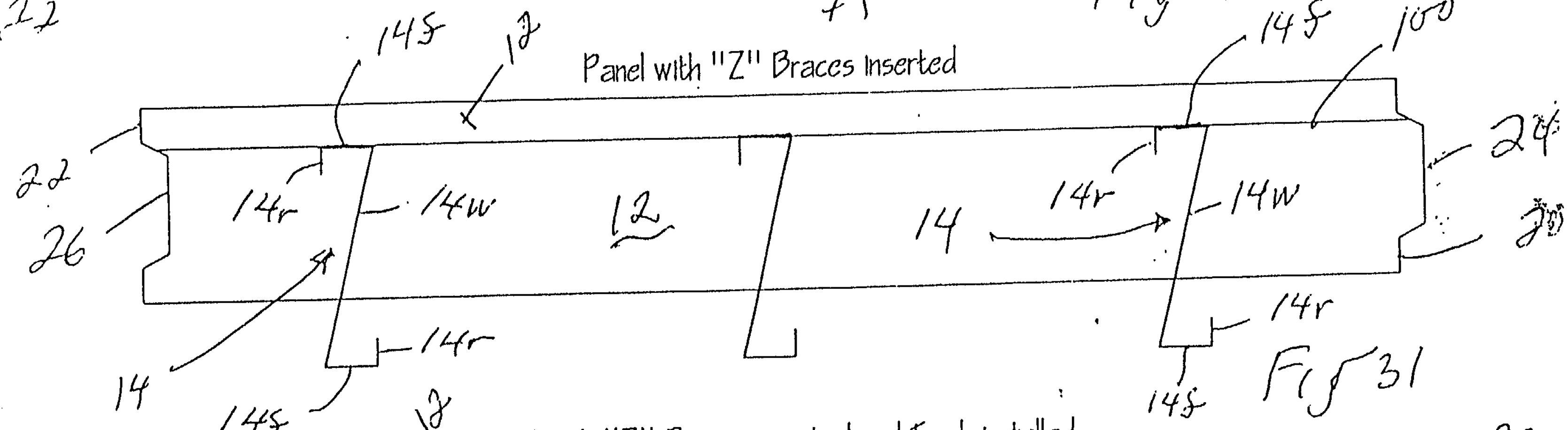
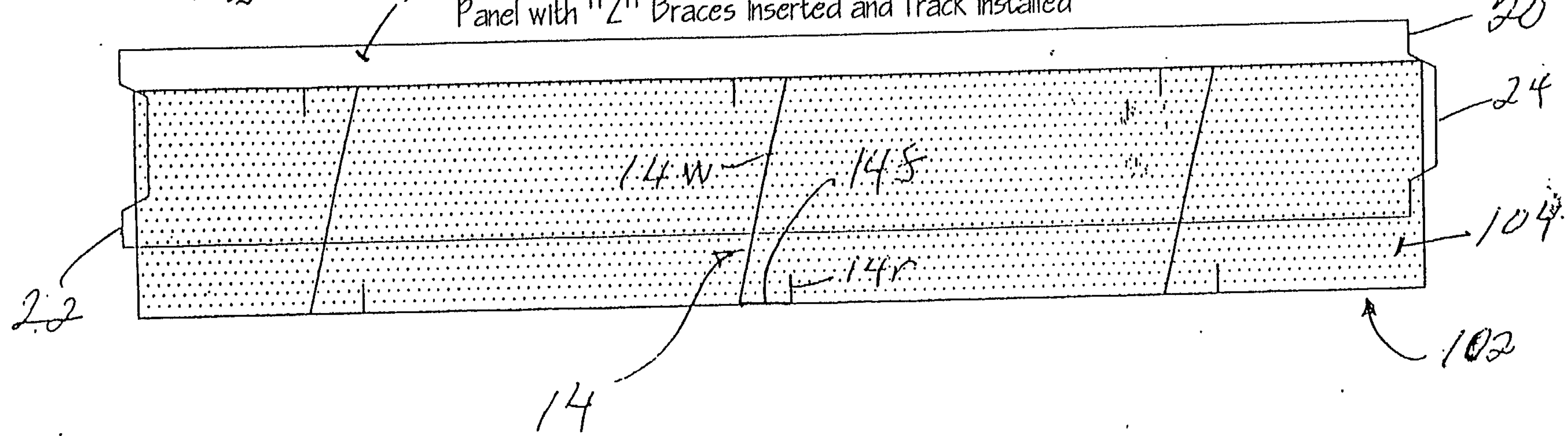


Fig 31

Panel with "Z" Braces Inserted and Track Installed



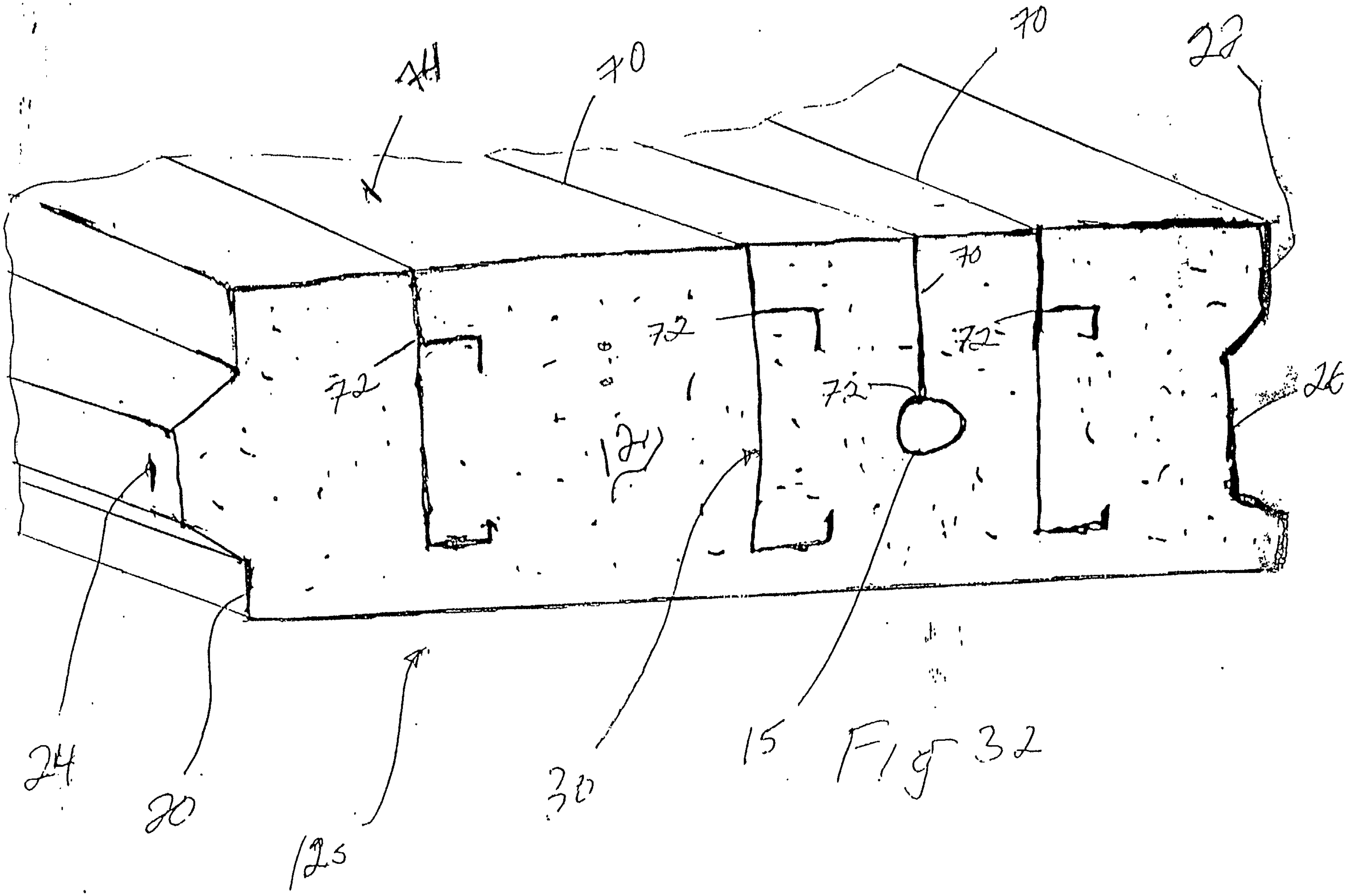
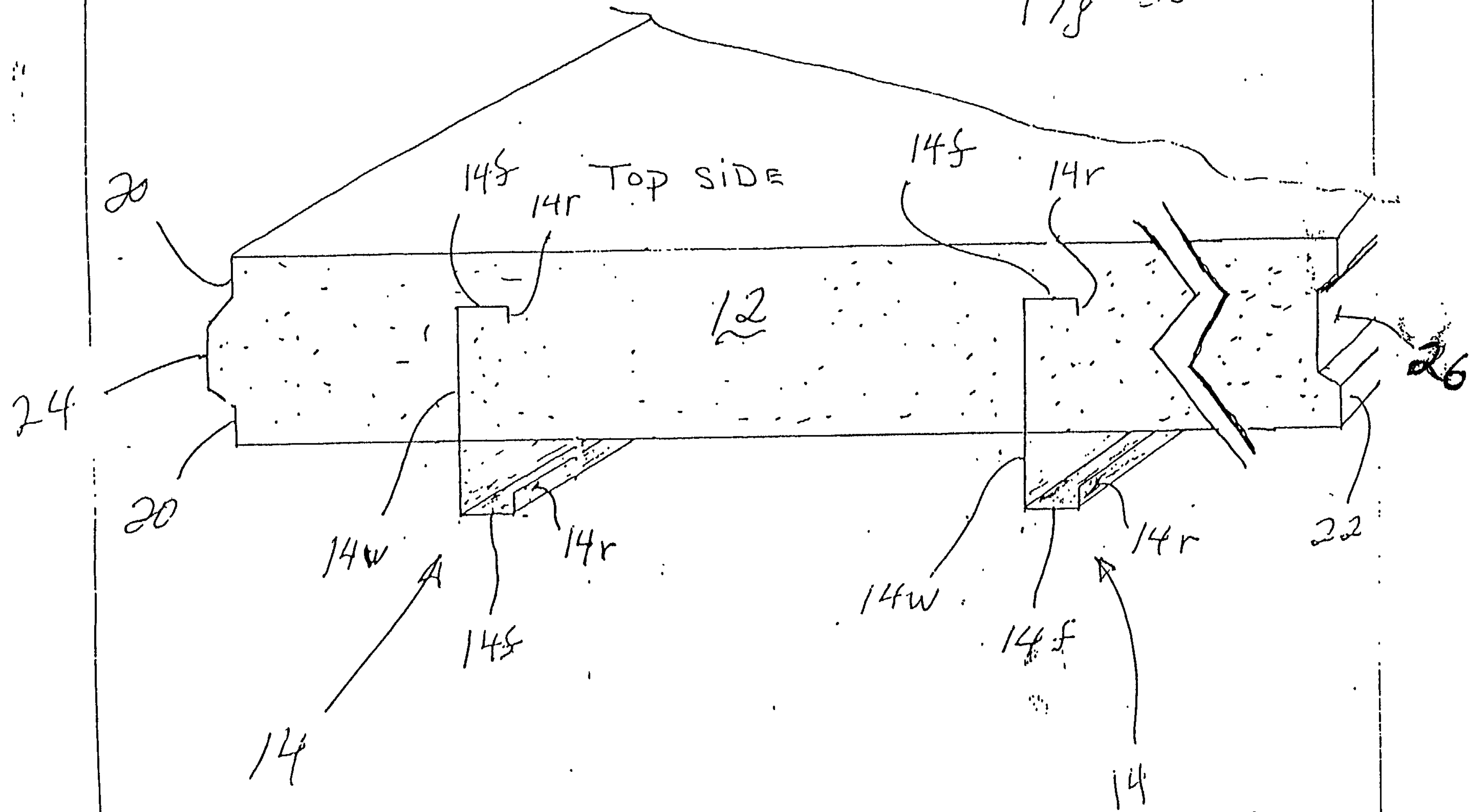


Fig 32

Fig 33



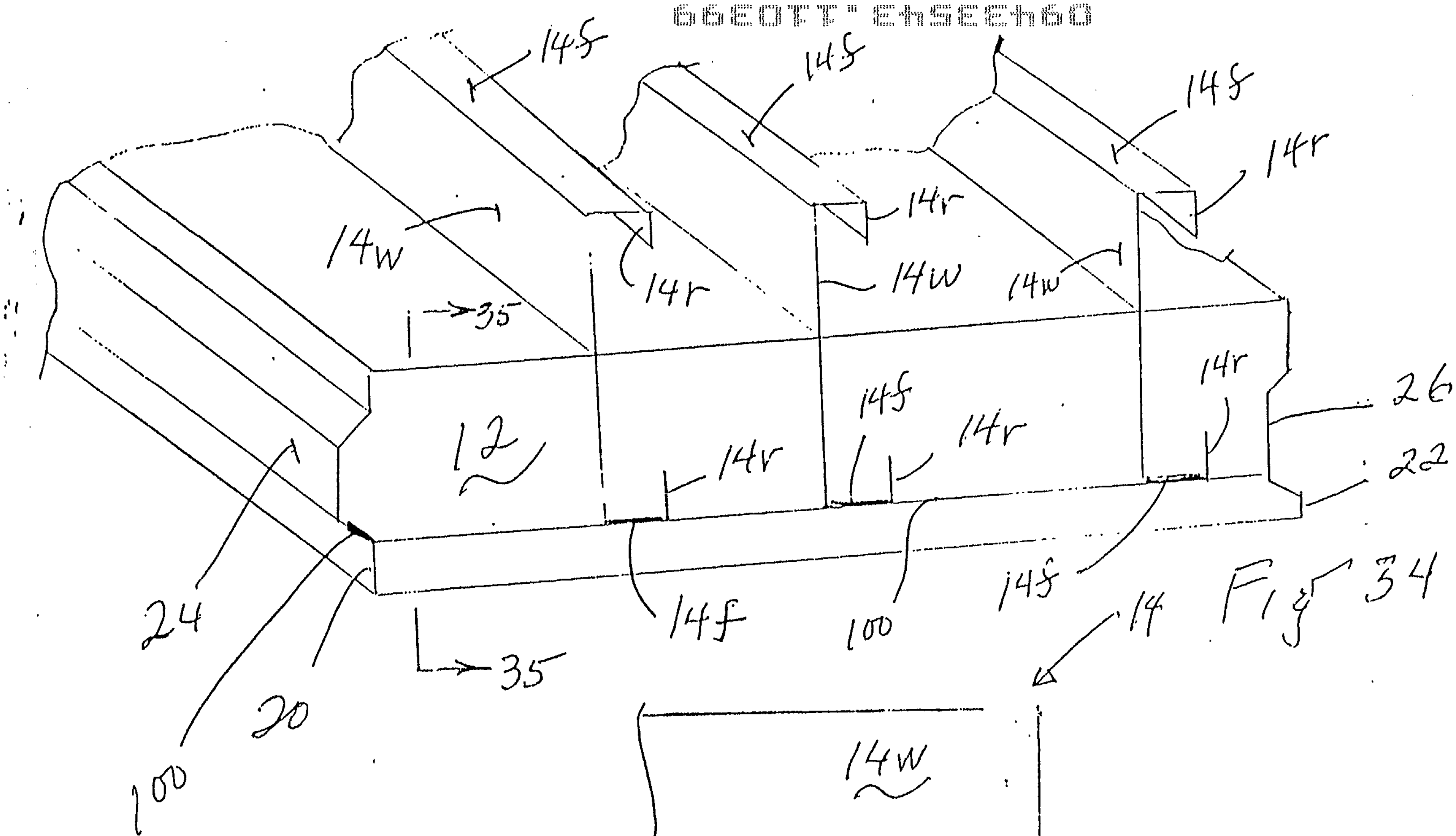

14s
14s
14s
14r
14r
14w
14r
14w
14w
35
12
14r
14s
14r
14r
26
22
24
100
20
14f
100
14s
35
14

Fig 34

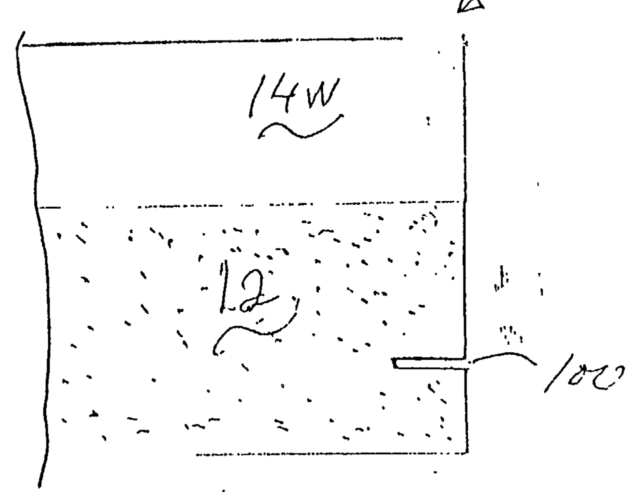
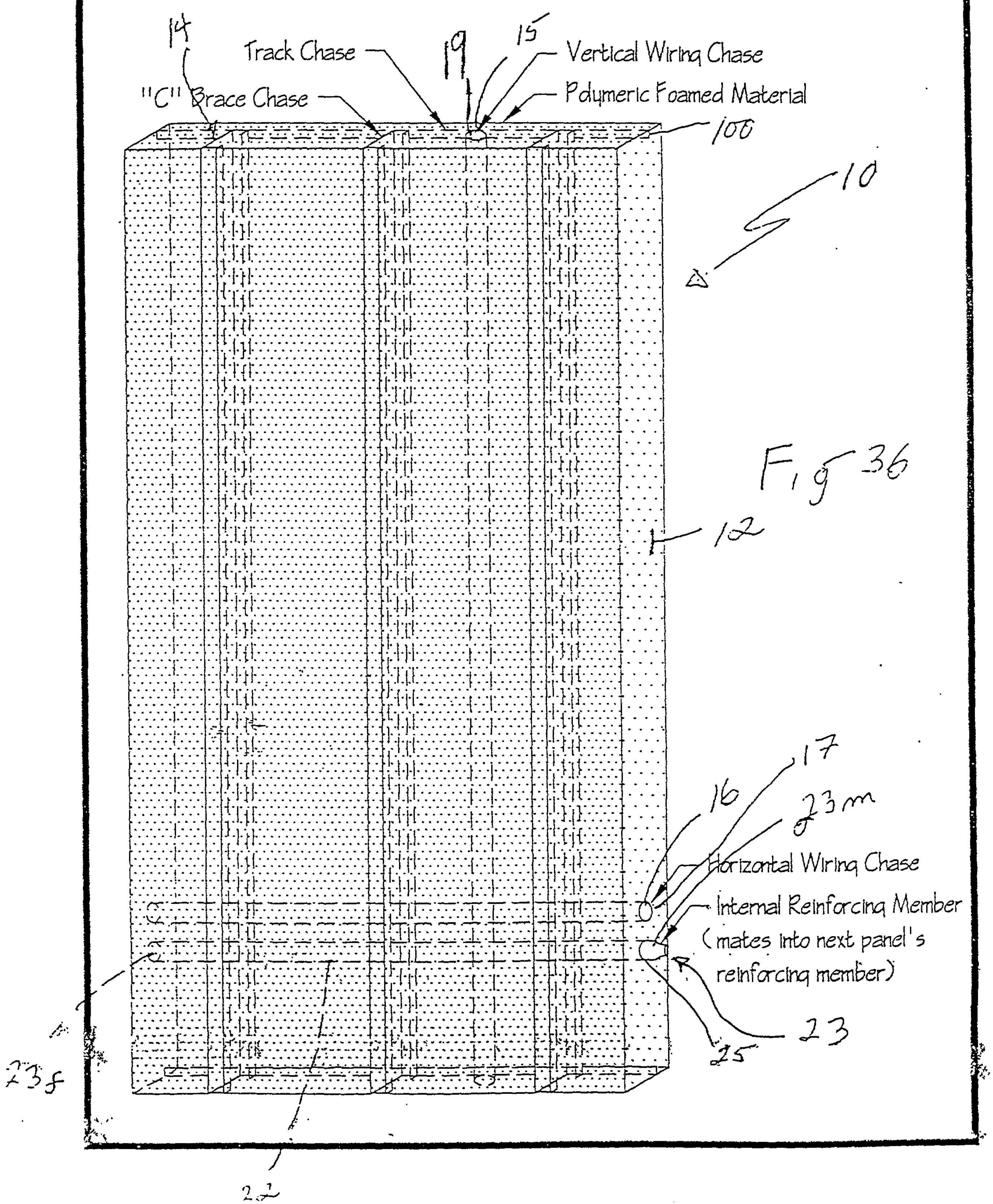

14w
12
100

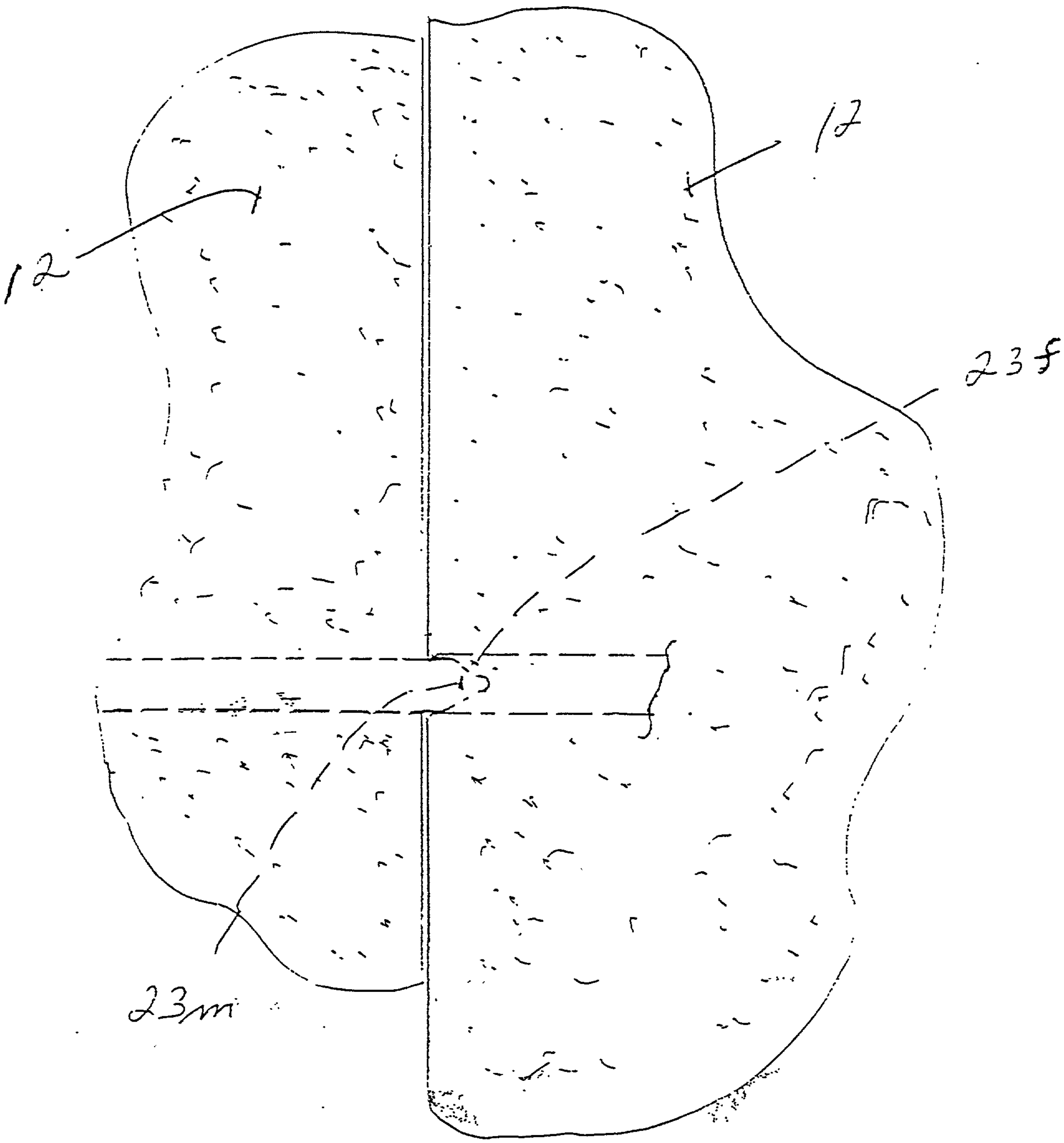
Fig 35

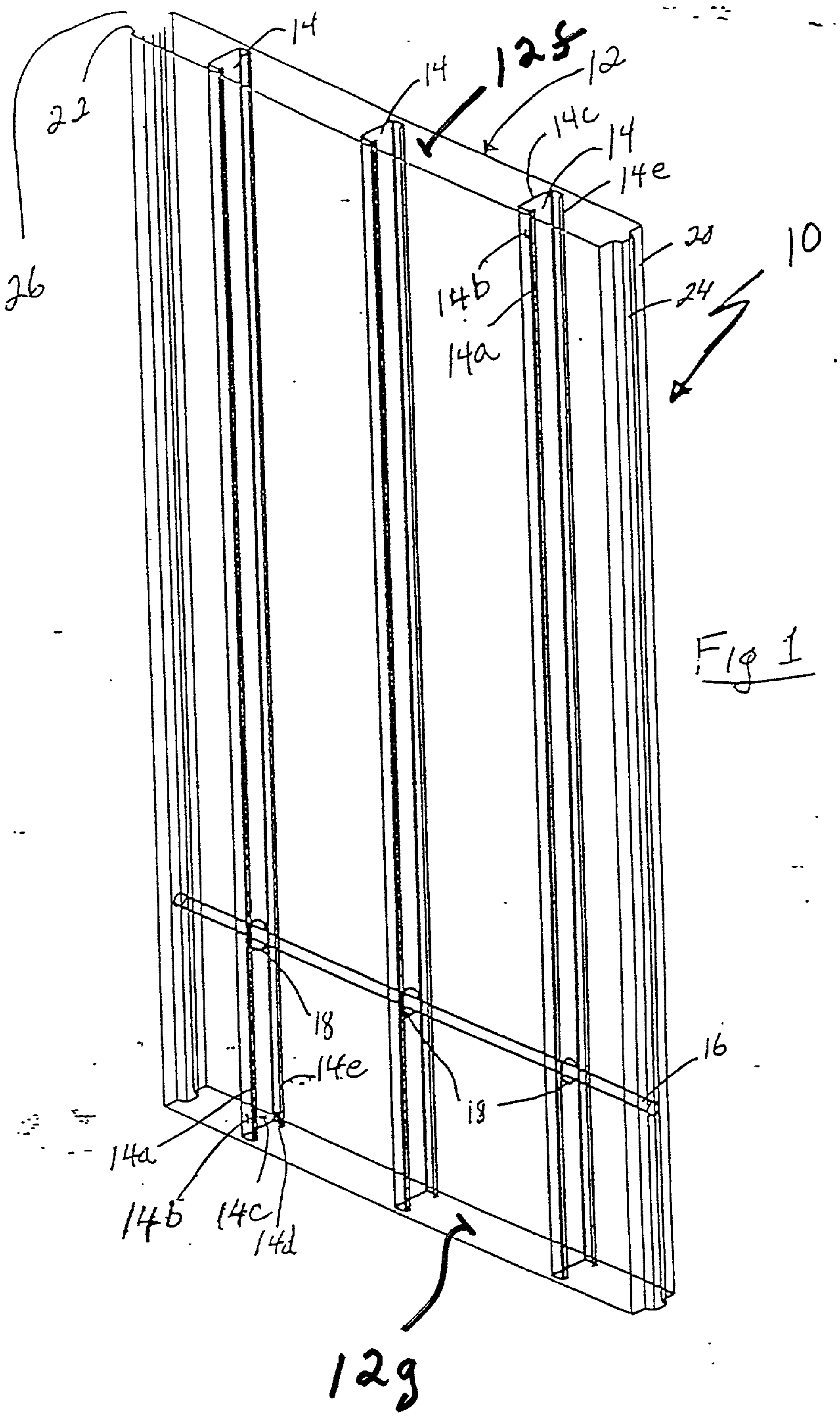


14
Track Chase
19
15
Vertical Wiring Chase
"C" Brace Chase
Polymeric Foamed Material
100
10
12
16
17
23m
Horizontal Wiring Chase
Internal Reinforcing Member
(mates into next panel's
reinforcing member)
23
25
23f
22

Fig 36

Fig 37





14
14
12f
12
14c
14
14e
20
10
22
26
14b
14a
24
18
16
14e
18
14a
14b
14c
14d
12g

Fig 1

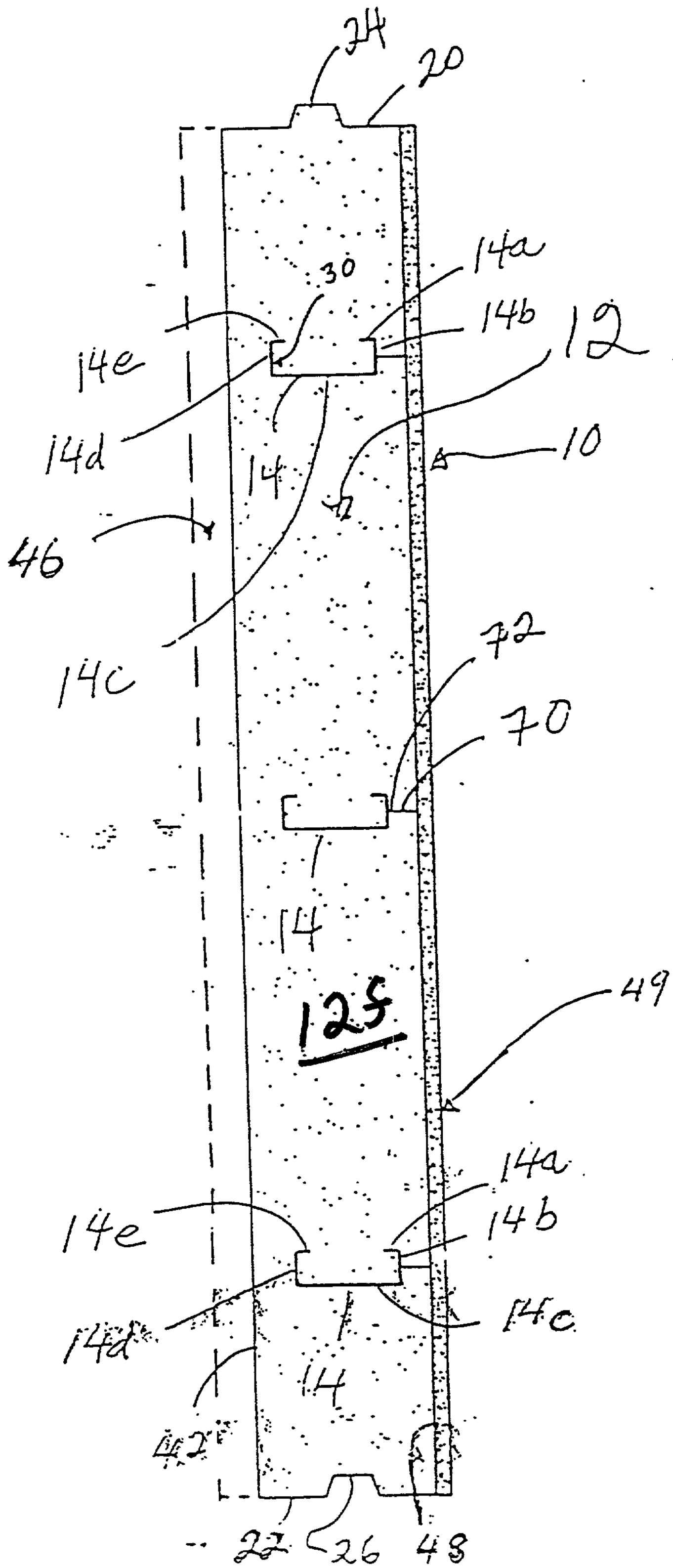


Fig 6

Sheet rock

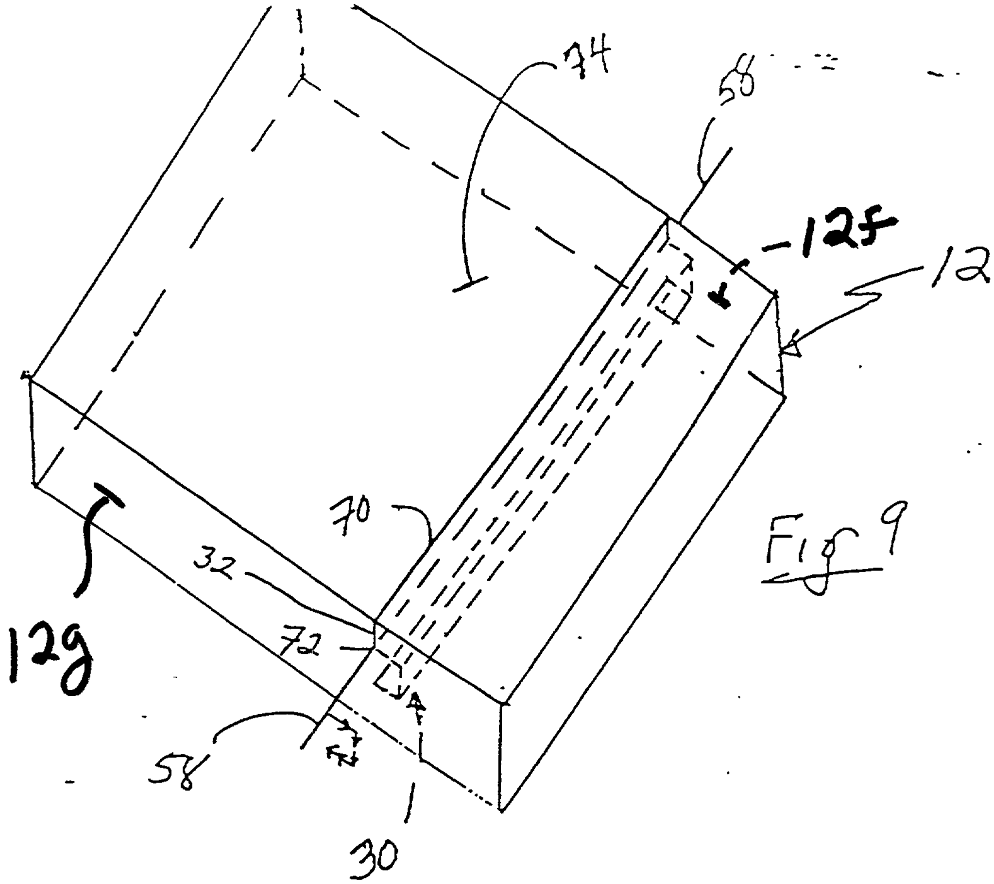


Fig 9

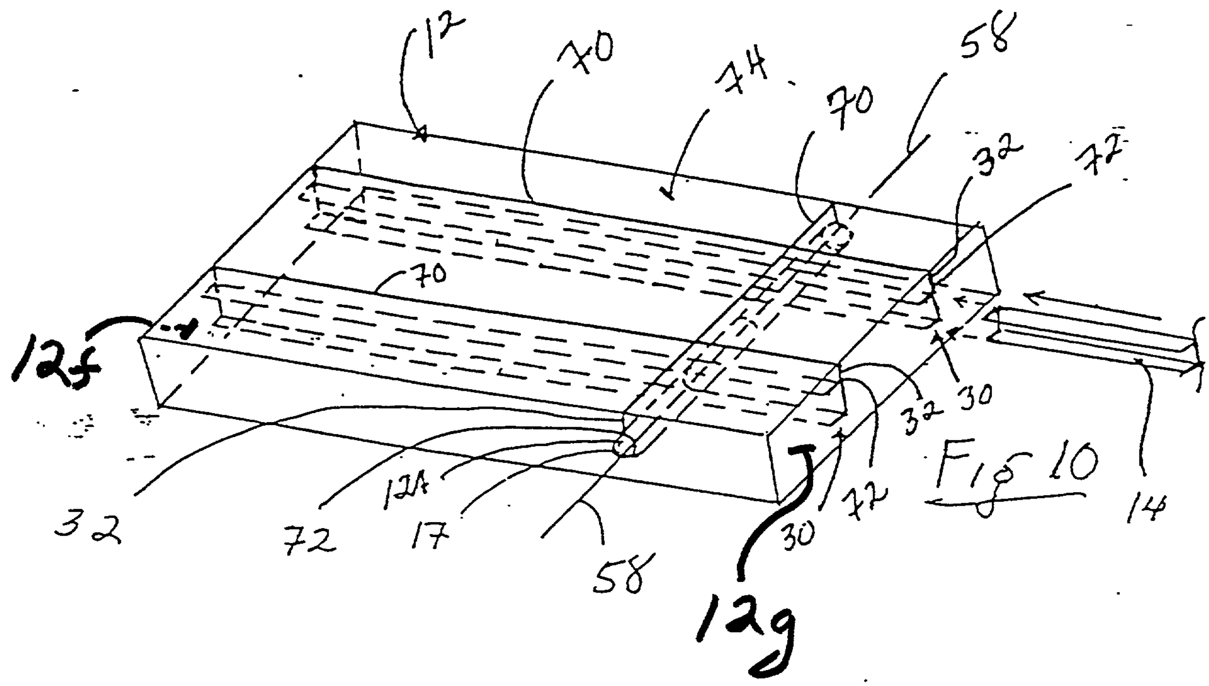


Fig 10

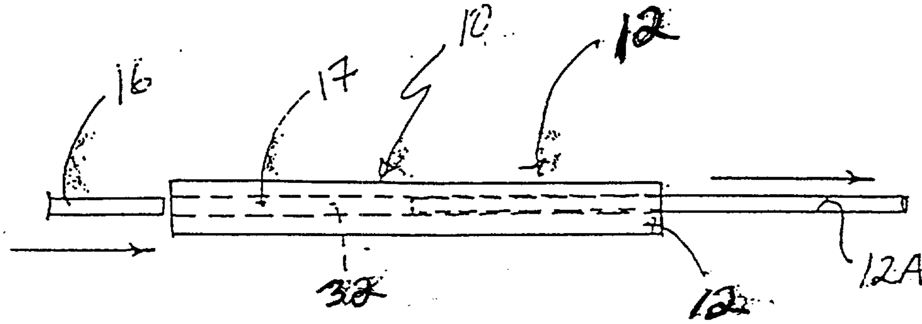


Fig 11

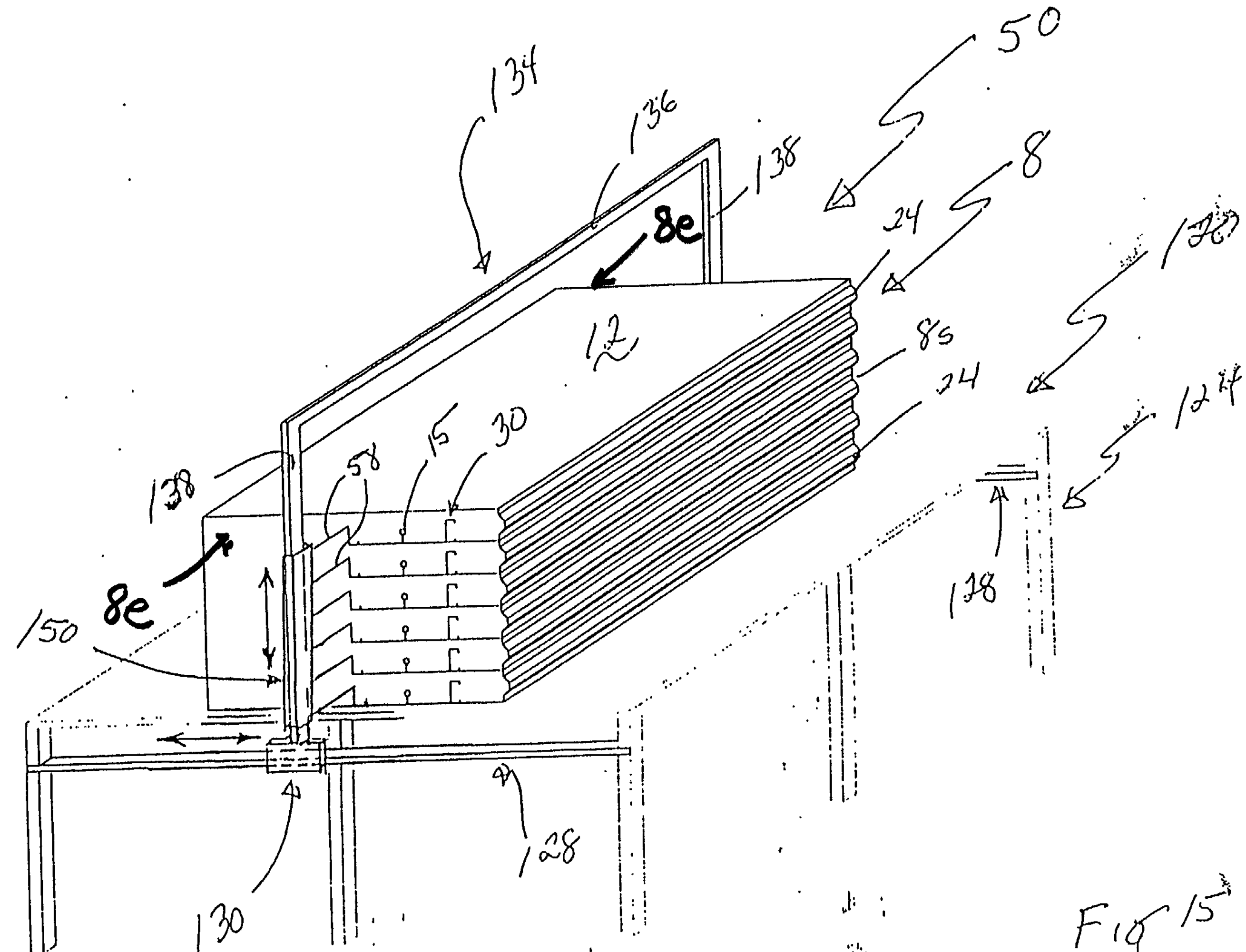

134
136
138
50
8
8e
24
12
85
24
128
124
138
58
15
30
8e
150
128
130
128

Fig 15

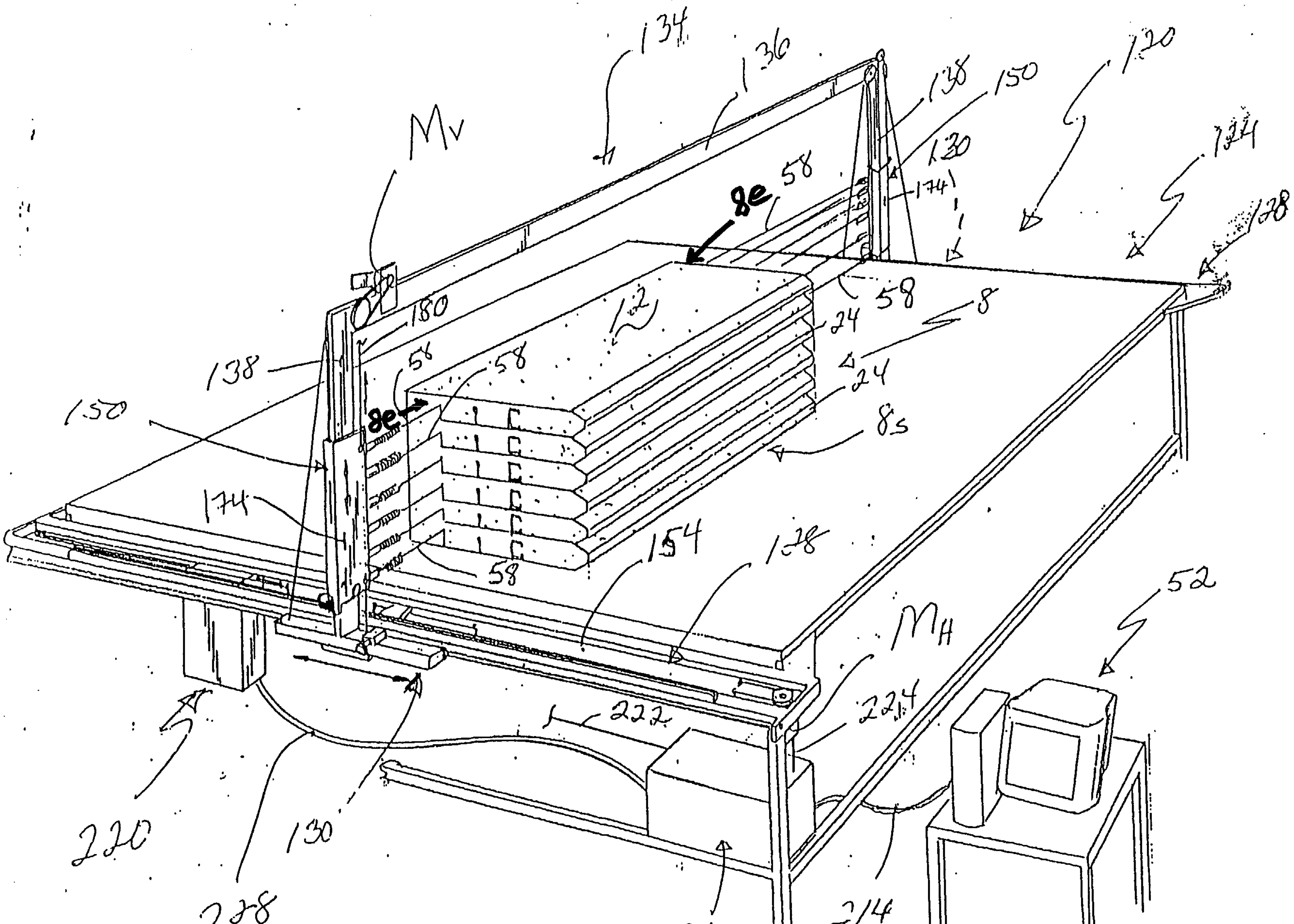

134
136
Mv
138
150
130
174
120
124
128
8e
58
180
12
24
8
8s
56
150
174
154
128
MH
224
222
52
220
228
130
210
214

FIG. 16

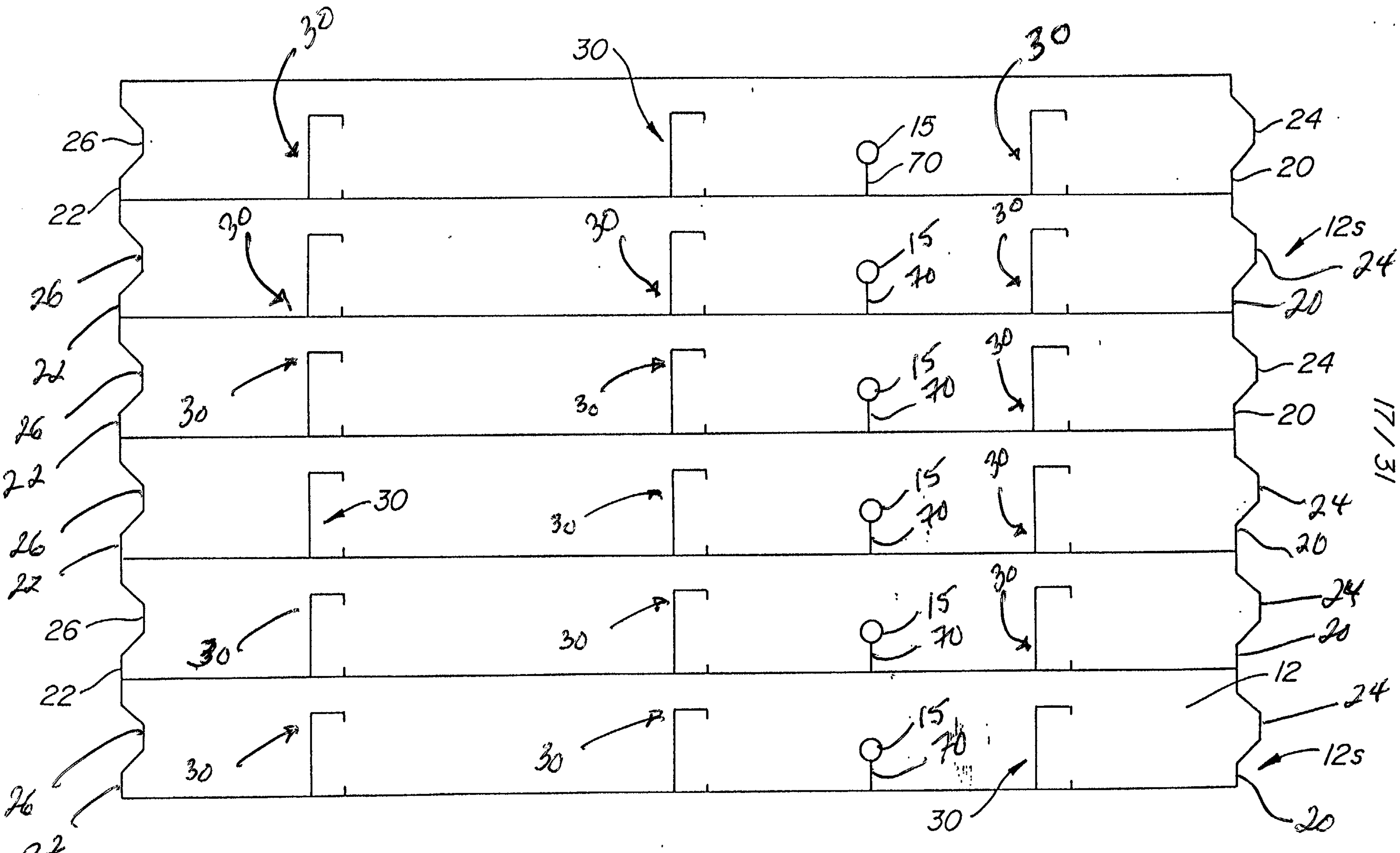

30
30
30
26
24
15
70
20
22
30
30
30
12s
26
15
70
24
20
22
30
30
30
24
26
15
70
20
22
30
30
30
24
26
15
70
20
22
30
30
30
24
26
15
70
20
22
12
30
30
24
26
15
70
12s
30
20
22

FIG. 19.

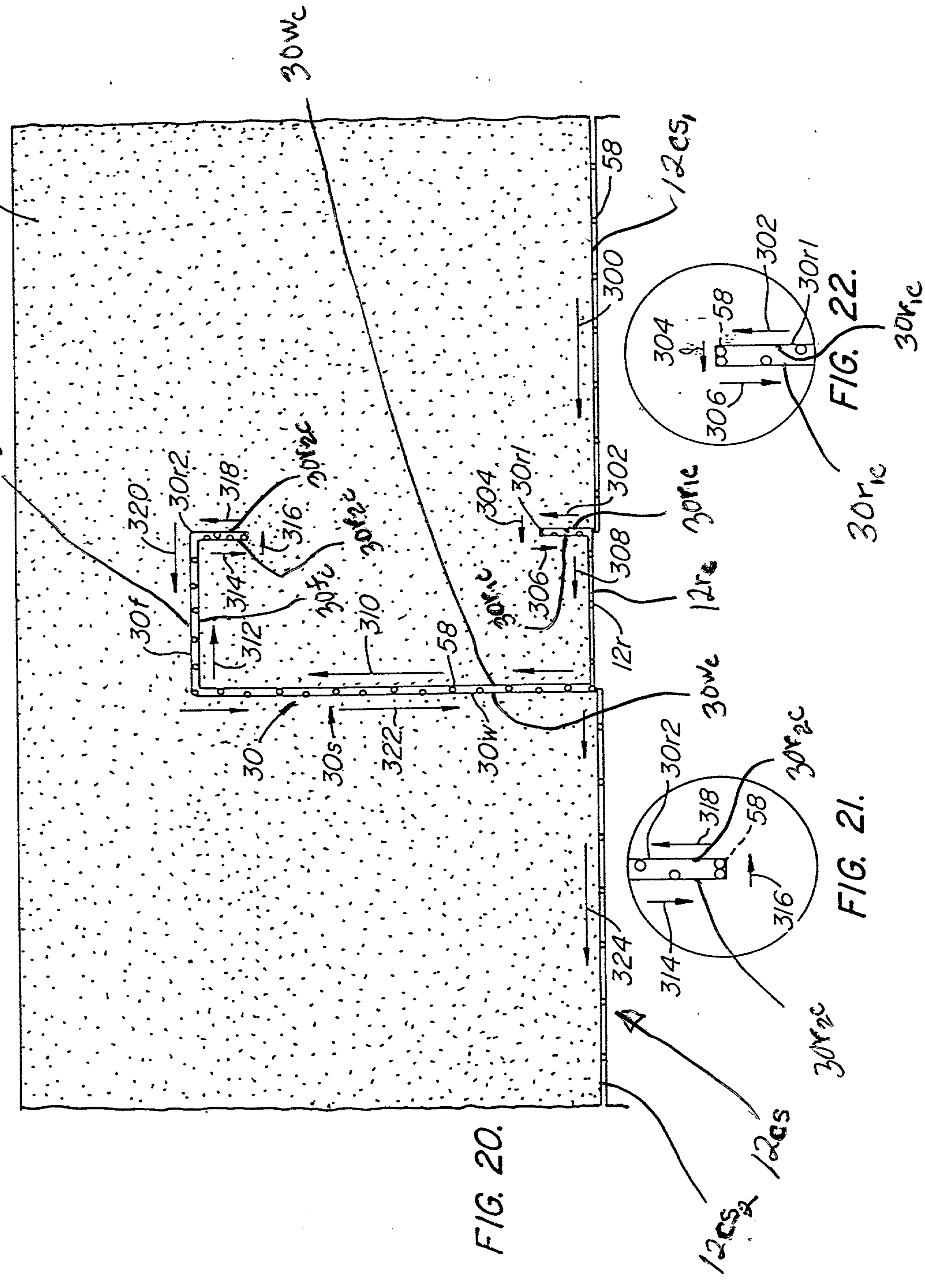


FIG. 20.

FIG. 21.

FIG. 22.

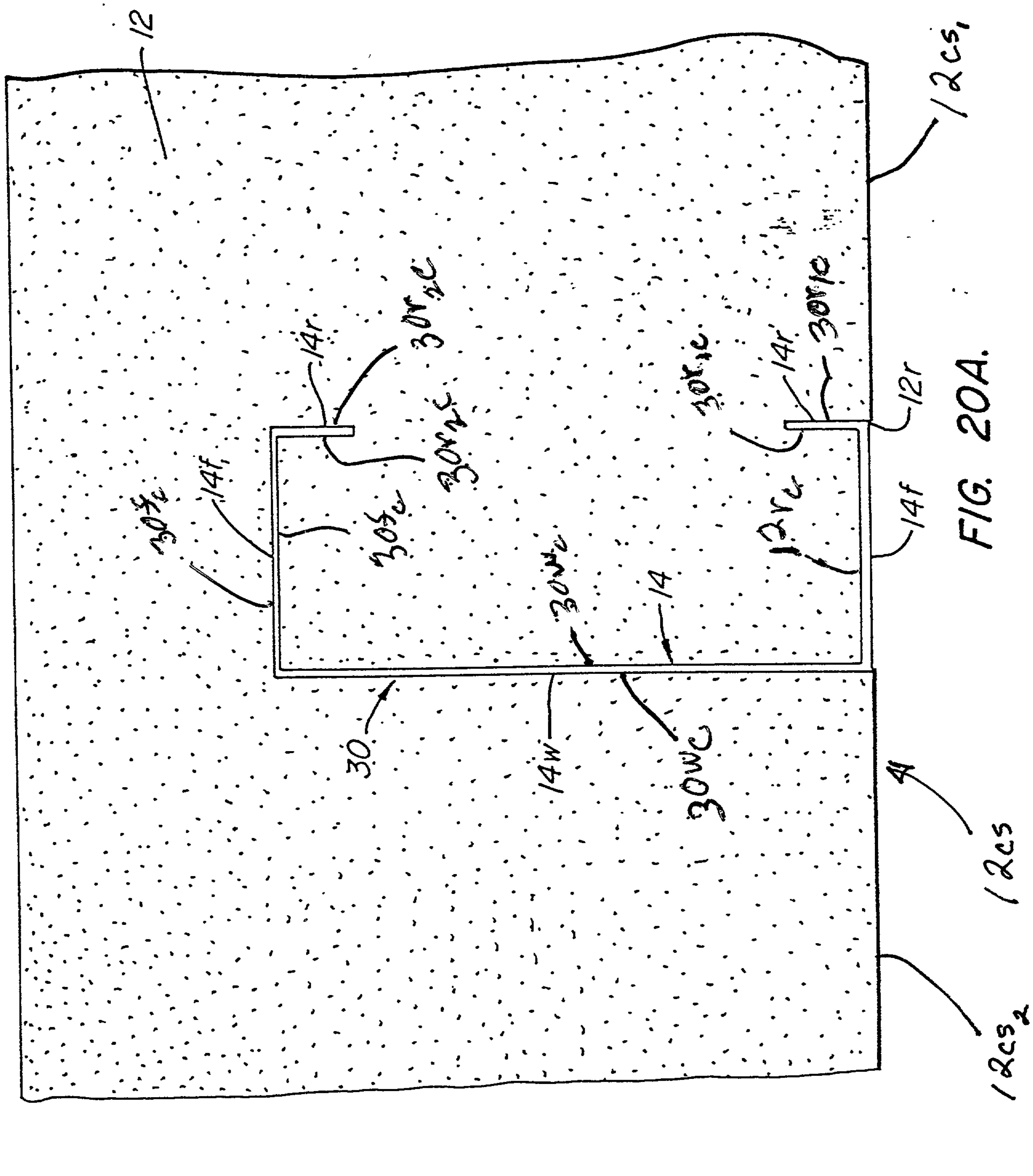


FIG. 20A.

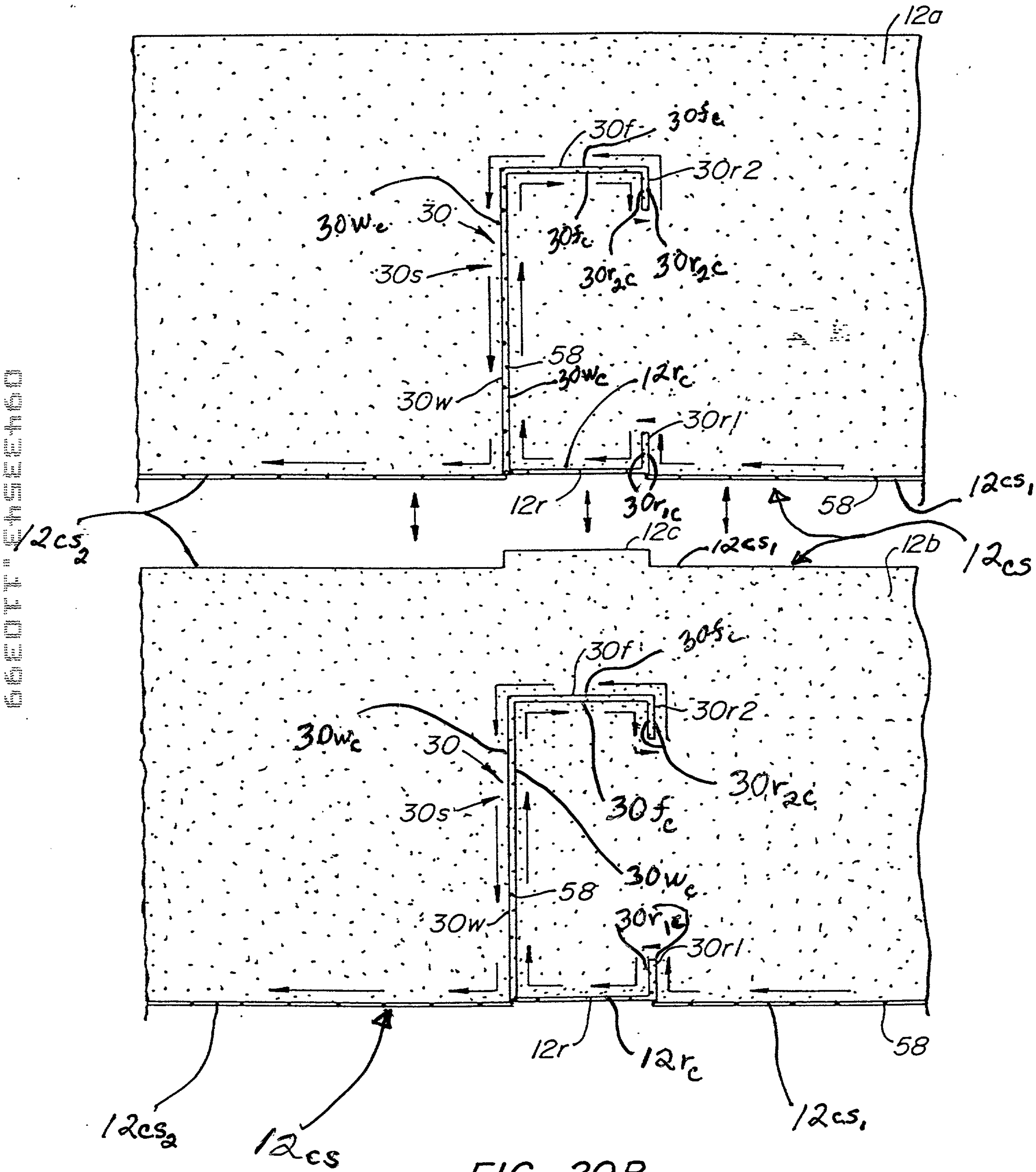

12a
30f
30fc
30r2
30wc
30
30fc
30r2c
30r2c
30s
58
30w
30wc
12rc
30r1
12r
30r1c
12cs1
58
12cs2
12c
12cs1
12b
12cs
30f
30fc
30r2
30wc
30
30r2c
30fc
30s
30wc
58
30w
30r1c
30r1
12r
12rc
58
12cs2
12cs
12cs1

FIG. 20B.

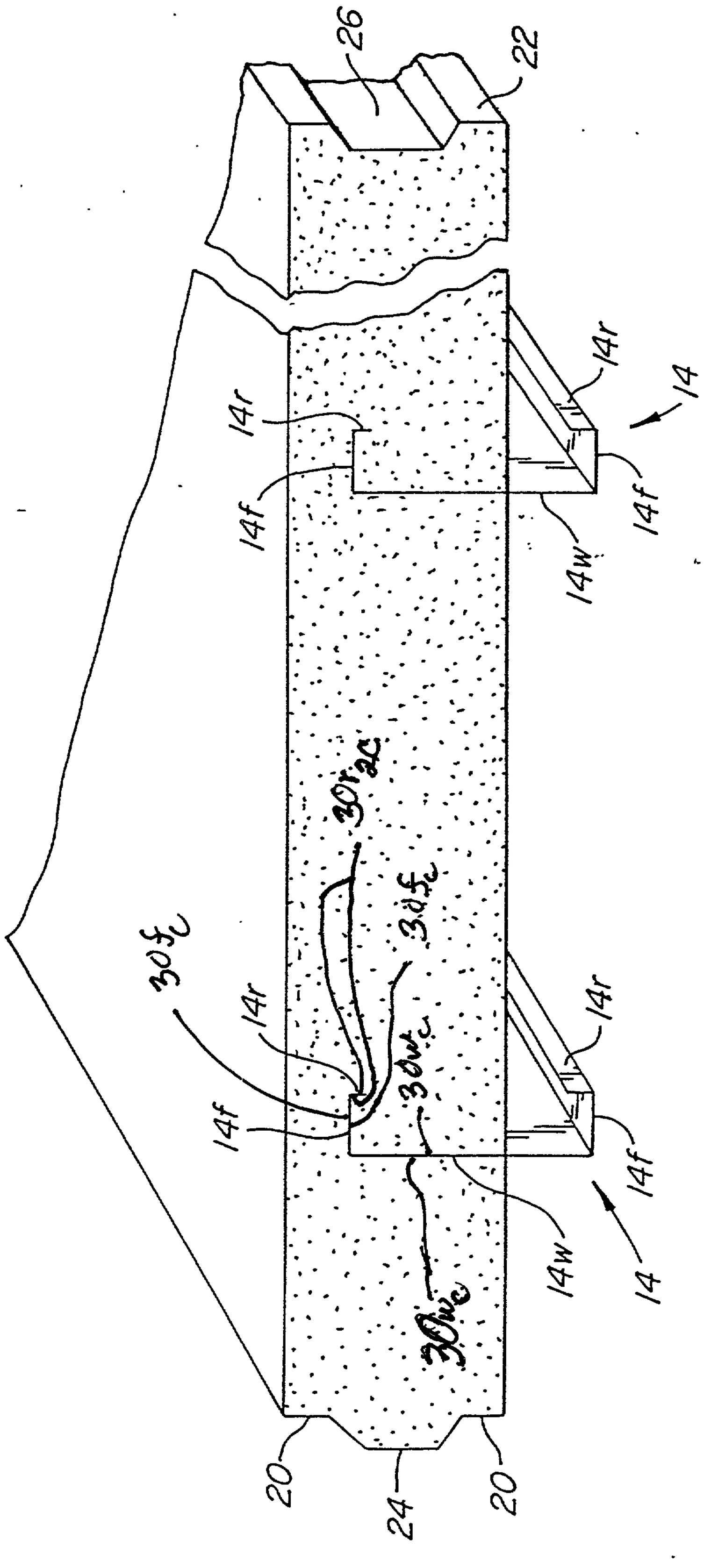


FIG. 33.

KAL 1-4-98

Attorney Docket No. 018696-1-1

DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I declare that:

My residence, post office address and citizenship are as stated below next to my name; I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: **AN IMPROVED SYNTHETIC PANEL AND METHOD** the specification of which _X_ is attached hereto or ___ was filed on ___ as Application No. ___ and was amended on ___ (if applicable).

I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56. I claim foreign priority benefits under Title 35, United States Code, Section 119 of any foreign applications(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Country	Application No.	Date of Filing	Priority Claimed Under 35 USC 119
			Yes _ No _
			Yes _ No _

I hereby claim the benefit under Title 35, United States Code §119(e) of any United States provisional application(s) listed below:

Application No.	Filing Date

I claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

Application No.	Date of Filing	Status
08/556,265	November 13, 1995	_ Patented _x_ Pending _ Abandoned
		_ Patented _ Pending _ Abandoned

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

J. Georg Seka, Reg. No. 2,491
John W. Carpenter, Reg. No. 26,447

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Residence & Citizenship	City	State/Foreign Country	Country of Citizenship	
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Full Name of Inventor 3	Last Name	First Name	Middle Name or Initial	
Residence & Citizenship	City	State/Foreign Country	Country of Citizenship	
Post Office Address	Post Office Address	City	State/Country	Zip Code

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signature of Inventor 1	Signature of Inventor 2	Signature of Inventor 3
Kenneth P. Lanahan Kenneth P. Lanahan		
Date 1-4-98	Date	Date

DP.MRG 8/96